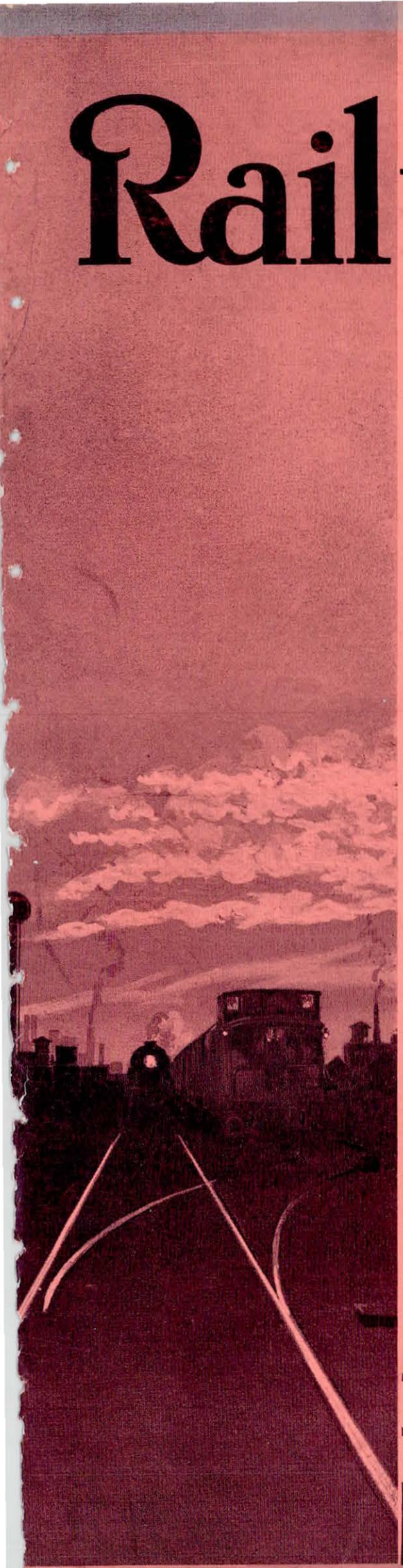
SEPTEMBER 12, 1931

Railway Age

FOUNDED IN 1856



Centralized Traffic Control Reduces Operating Costs

Article No. 10
See page 388

GENEVA COLLEGE LIBRARY
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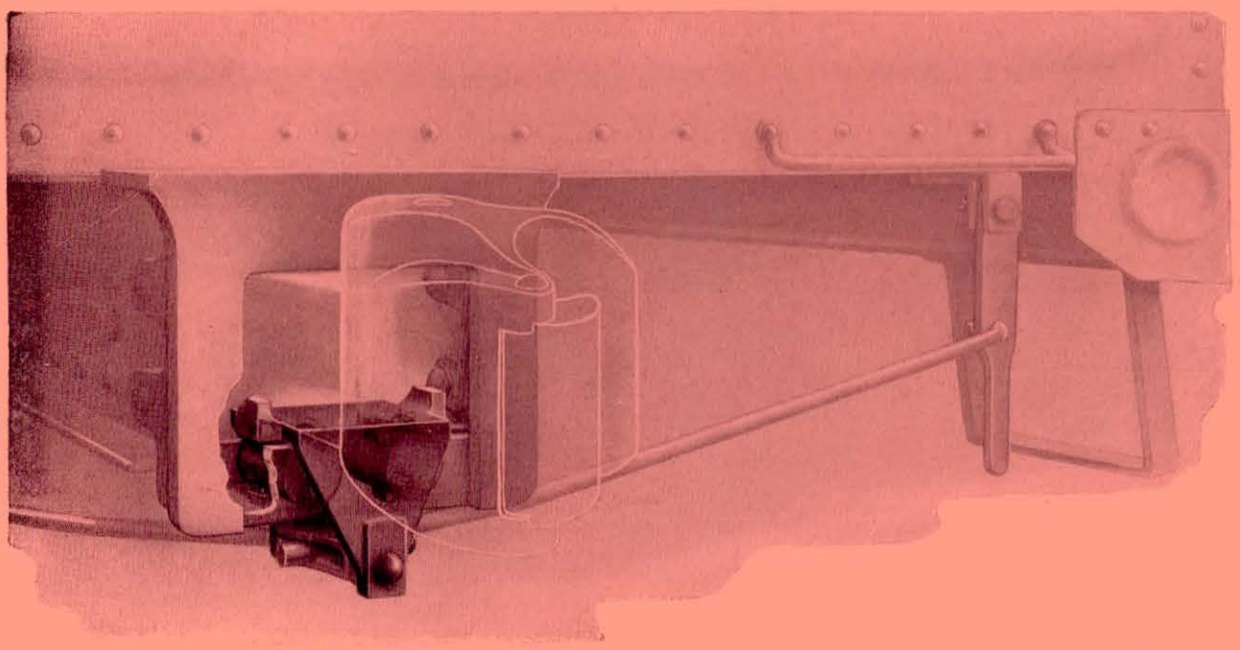
BEAVER FALLS, PA.

NEXT WEEK
Article No. 11

"Greater Use of Machines in Maintenance Work Will Produce Greater Economies"

OPERATING ECONOMY SERIES

Universal
DRAWBAR ADJUSTER



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INCORPORATED IN THE A.R.A. BUFFER

OR

U.S.R.A. CARRY IRON

Universal Draft Gear Attachment Co.

332 S. Michigan Avenue, Chicago

Royal Bank Building, Montreal, Canada

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Solves P. & P. U. Operating Problem

The Peoria and Pekin Union Railway, handicapped by high train density, many junction points, an engine terminal, a classification yard, a single leaf bascule bridge, three peak traffic periods daily, and reversals of traffic running under close headway, was faced with the problem of improving its connecting and interchange service to 14 railway systems.

ANTICIPATION

Careful investigation and an economic study disclosed that a G.R.S. CTC System covering the 7½ miles of road would produce a tangible annual return of 20% on the investment, besides providing the desired greater facility of operation.

REALIZATION

The first 24 hour period after this G.R.S. CTC System was placed in service saw 163 train movements handled with ease.

This system has been giving 100% service for several months and has thoroughly demonstrated that the optimism of the officers responsible for its adoption was more than justified.

SUMMATION

In addition to realizing fully the anticipated tangible savings, it is yielding many indirect benefits that could only be surmized while under consideration. It has been estimated that an intangible annual return of 15.5% is beng realized because of the train hours saved.

A dissertation on this installation may be found in the A.R.A. Signal Section Proceedings, Volume 23, No. 3, June, 1931.

32 G.R.S. CTC Machines are being used to direct trains by signal indications on 14 railroads. You, too, can realize substantial savings on your road. Write our engineers. They are specialists on this system.

GENERAL RAILWAY SIGNAL COMPANY

ROCHESTER, N. Y.

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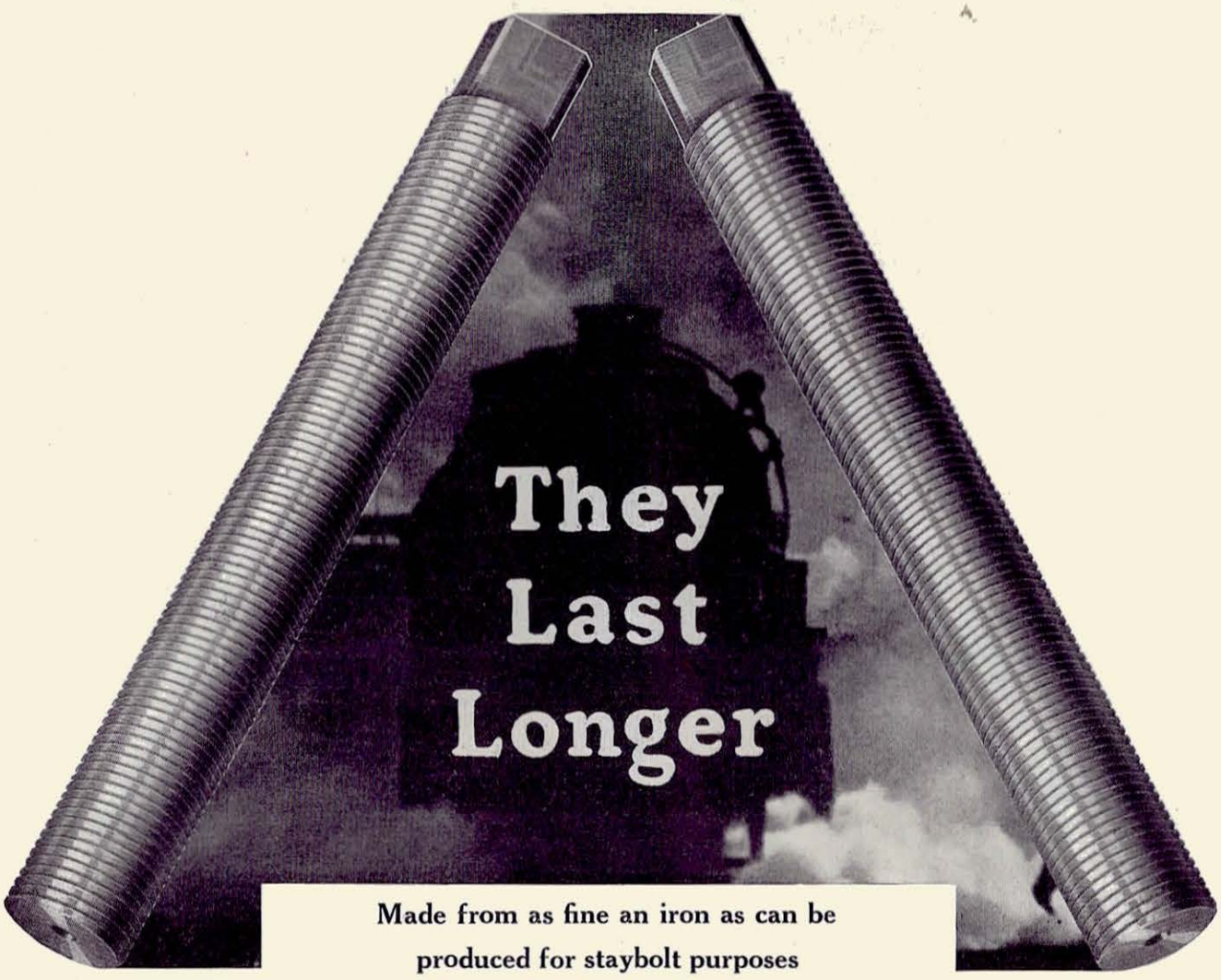
Lewis Special Hollow Staybolts



Made from as fine an iron as can be produced for staybolt purposes

Lewis Special Hollow Staybolts are made from an iron produced especially for Railroad Locomotive staybolts. It is strong and tough, with a rope-like fibre, which gives unusual endurance.

Lewis Special Hollow Staybolts are made from a solid bar of this iron. The hole is drilled straight through the center of the bar—a perfectly round hole easily kept clean and open, providing an infallible warning should failure occur in any part of the bolt.

Lewis Special Hollow Staybolts will pass the most rigid railroad specifications—and they will give remarkably long service.

Let us send you samples to test—then compare prices. Furnished headed, threaded, or headed and threaded.

Lewis Special Hollow Staybolts conform to A.S.T.M. Specifications A-84-27 (Grade A)

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RAILROAD-SERVICE

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Railway Age

With which are incorporated the Railway Review, the Railroad Gazette and the Railway Age-Gazette. Name Registered U. S. Patent Office.

Vol. 9 September 12, 1931 No. 11

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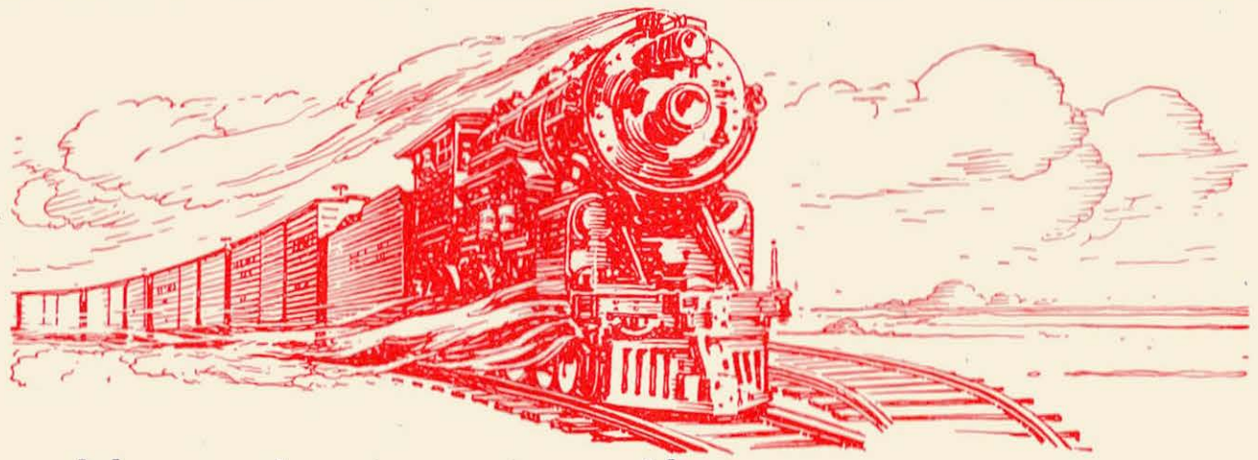
DON'T STOP THIS TRAIN



avoid waste energy...time...wear...expense

The Racor 3-in-1 Switch Stand (style No. 100-A) is especially designed for use at the ends of double track and passing sidings. It maintains a right of way in both directions . . . eliminates train stops for switching operations. When installed at locations of average traffic the 3-in-1 makes possible an annual saving of $18,250.

"On Velvet" in a Month

The only alternatives to the 3-in-1 are: First, remote control systems, expensive to install and to operate; second, old-fashioned spring switch rods causing the points to pound against the stock-rail between successive pairs of wheels; or third, the addition of a dash pot, cumbersome and difficult to keep in adjustment . . . Instead, install the Racor 3-in-1 Switch Stand, a self contained unit . . . its savings place you on "Velvet" in a month.

Three Features in One

It combines three simple mechanisms in one compact housing. They are:

1. A rigid-throw for hand operation.
2. Two double-coil springs returning points after trailing train has passed.
3. An oil-buffer retarding return of points between successive pairs of wheels.

Severe tests by many leading railroads have caused them to adopt this Stand as standard. None of our claims has been disproved . . . They showed conclusively that the Stand could not be locked with an intervening object between a switch point and stock-rail. The 3-in-1 Switch Stand has earned a large and immediate profit at all locations it has been used . . . It has speeded train movements. We want the privilege of supplying your road with these Stands. Write for complete information. Your request will receive instant response.

RAMAPO AJAX CORPORATION

Racor Pacific Frog and Switch Company . . . . . Los Angeles—Seattle
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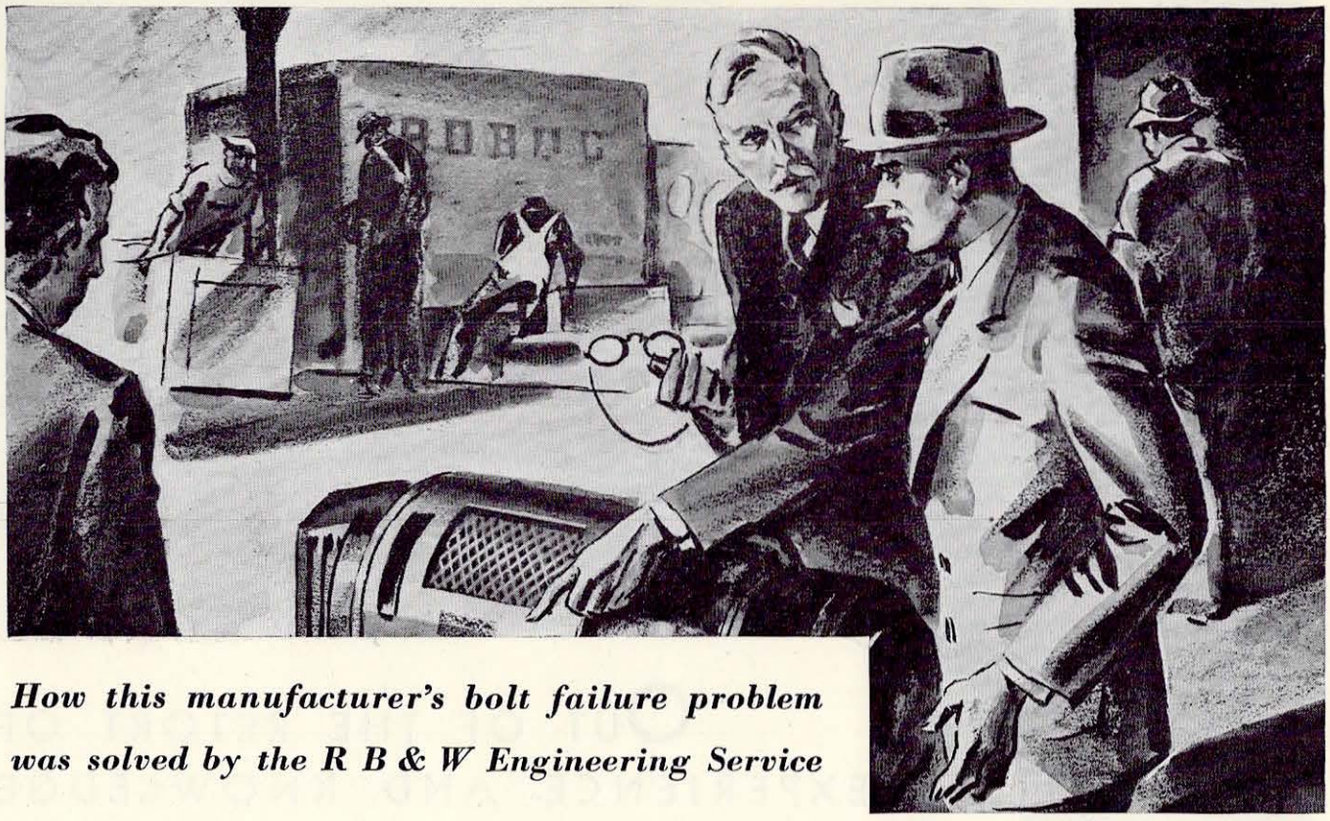
RACOR
TRADE MARK

HE FORGOT...
TO FIGURE INITIAL STRESS



How this manufacturer's bolt failure problem was solved by the R B & W Engineering Service

"Bolts still failing. Rush new shipment. Must have higher tensile strength." Thus wired a customer. And then the R B & W Engineering Service got busy.

The customer was a builder of a portable electric machine used in construction work. He was using bolts to attach the heavy machine assembly to the frame of a trailer truck. We had tested specimens of his bolts before shipment and they had shown 86,000 pounds, so the next thing to do was to make an on-the-spot investigation.

We discovered that the customer, when estimating the strength of the bolts he needed, had forgotten to allow for the initial stress placed on the bolts when his machine was assembled. The bolting together of the parts exerted a stress, which, when increased by service loads, exceeded the capacity of his bolts. A slight increase in diameter of the bolts eliminated his trouble.

The skilled engineer, and the layman as well, can utilize the specialized knowledge of bolting material available without obligation through the R B & W Engineering Service. Send us your problems.

RUSSELL, BURDSALL & WARD BOLT & NUT CO.

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Sales Offices at Philadelphia, Detroit, Chicago, San Francisco, Los Angeles, Seattle, Portland, Ore.

OUT OF THE RETORT OF EXPERIENCE AND KNOWLEDGE come Inland Quality and Inland Service

Inland was one of the pioneers of the steel industry in the Central West . . . its history dating from 1893. Side by side Central Western Industry and Inland have grown . . . Industry calling upon Inland, Inland responding.

From that long and intimate association has grown a vast store of knowledge of the applications of steel . . . of the full requirements of those applications. Always has Inland kept pace, through extension of its research activities, its physical facilities, through complete control of raw-material sources, and an entire eagerness to serve.

Inland is grateful to the many friends who have co-operated so splendidly during these years, and it stands ready to place this experience at the disposal of all users of steel. INLAND STEEL COMPANY, 38 South Dearborn Street, Chicago, Illinois.

INLAND STEEL

ABLE SERVANT OF THE CENTRAL WEST

Sheets Bands
Bars Plates
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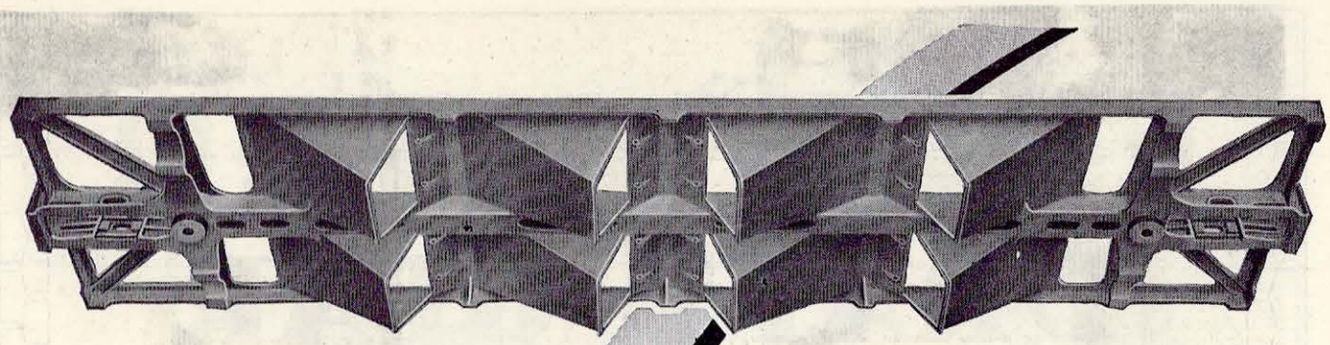

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One strong unit

ONE PIECE
CAST STEEL
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Provides Increased Strength

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Designed for All Types of Cars

An Excellent Investment

GENERAL STEEL CASTINGS CORP.

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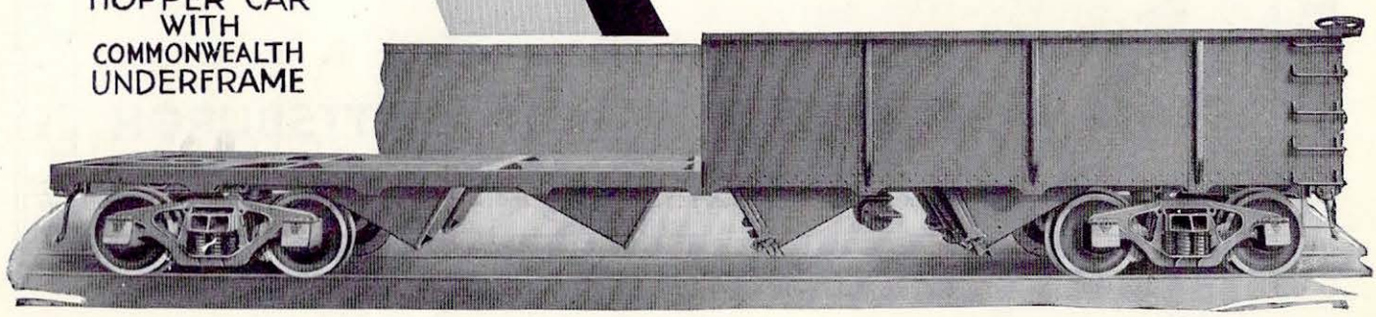
HOPPER CAR
WITH
COMMONWEALTH
UNDERFRAME



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SIMPLICITY

No greater simplicity is obtainable than that of the EDGEWATER Draft Gear.

The gear is a simple self-contained unit.

No replacements or attention are required during the life of the gear.

No spare parts need be carried in stock.

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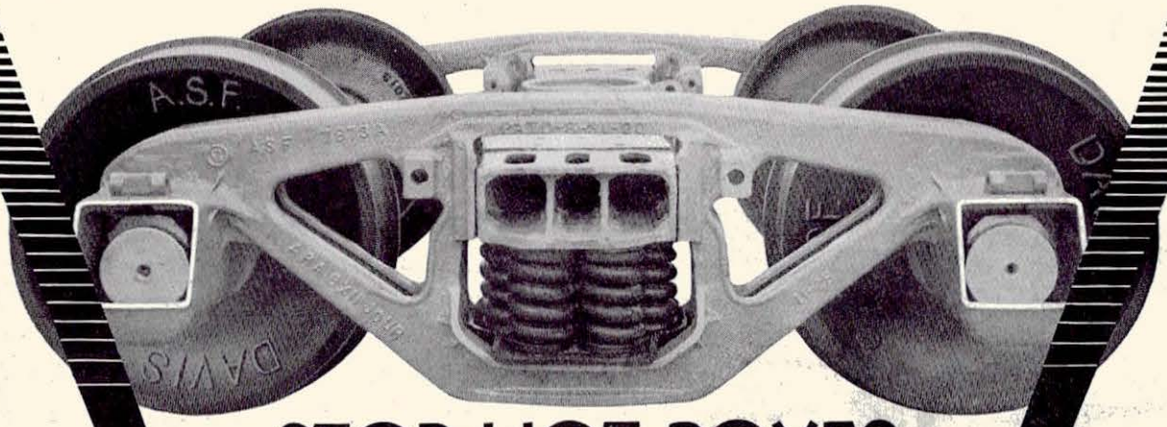
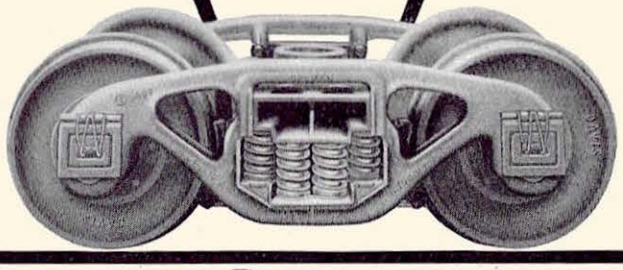


STOP HOT BOXES

THE additional spring capacity of the Dalman Truck protects not only equipment, lading and road-bed from destructive shocks but also the journal itself. The uncushioned blows caused by either overloading or failure of springs breaks down the film of oil and causes hot boxes. The Dalman Truck provides the spring capacity to cushion these blows, so that the film of oil is maintained, materially reducing bearing trouble.



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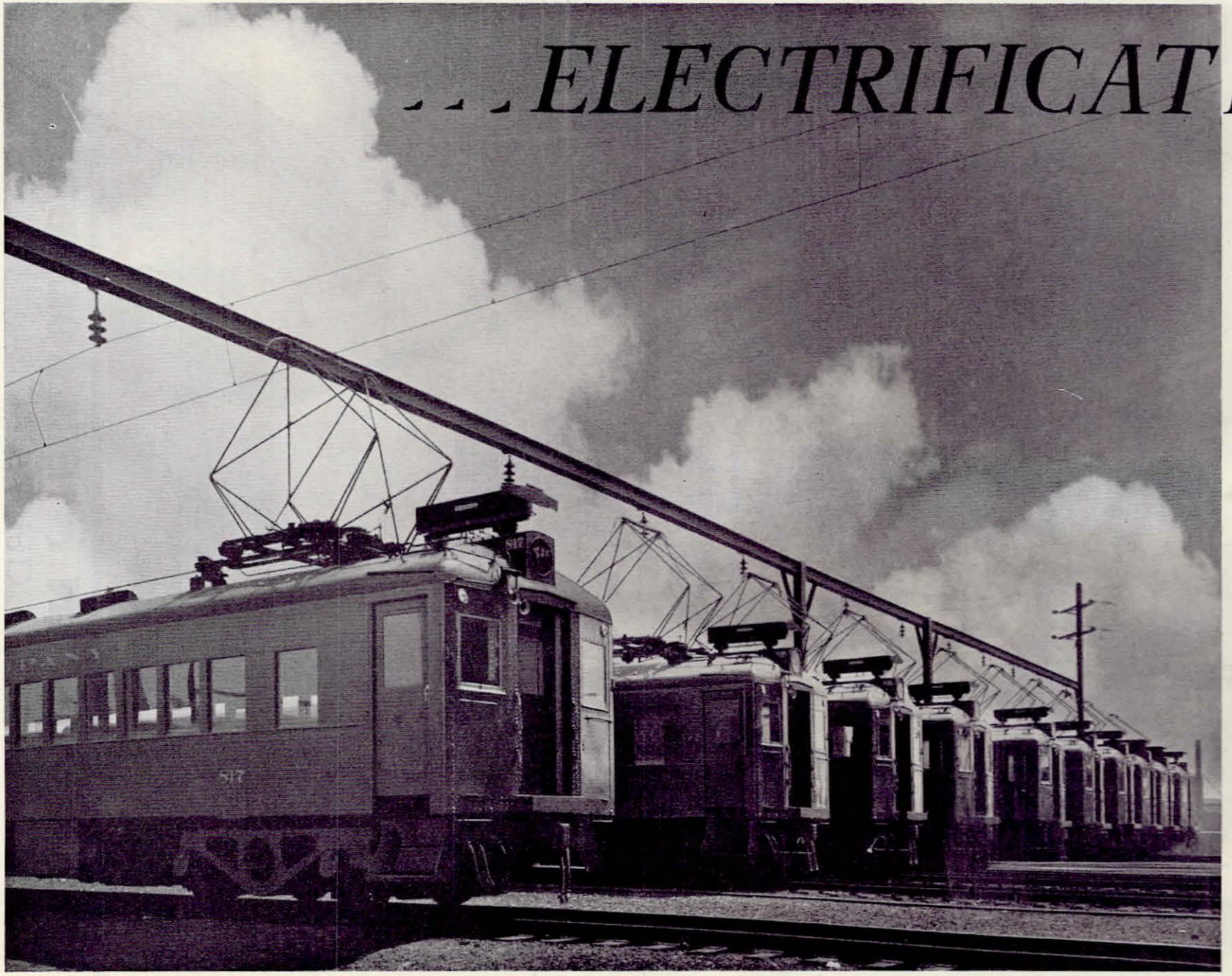

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which it
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Trucks,
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cast by
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BIRDSBORO,
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keep pace
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with
. . .
Reading Co.
. . .
progress

An advertisement of the Birdsboro Steel Foundry & Machine Company of Birdsboro, Pennsylvania.

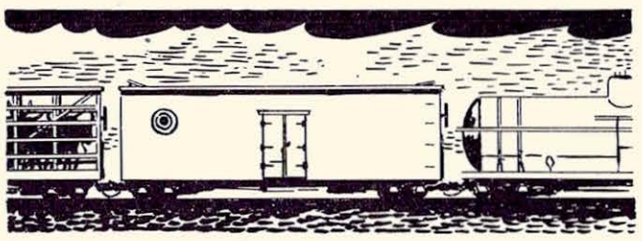
TODAY
NO MAN CAN STAND ALONE

WE HAVE come far from the time when we bartered a sack of potatoes for a pair of shoes. But the basic principle remains the same. The farmer needs the product of the manufacturer, the manufacturer cannot live without the products of the farm. Commodities from all the world must be transported from one man to another.

Most important to the efficient exchange of these products is railroad transportation . . . and railroad transportation's foremost aid, the General American Tank Car Corporation. Cotton from the South, grain from the Middle West, cattle from Texas, fruits and vegetables from all over the country . . . these are fundamental necessities of life. And all of them, as well as thousands of other commodities, are carried in General American railroad freight cars.

Some of these cars are leased to shippers from our vast fleet of more than 50,000 carriers . . . refrigerator, milk, express refrigerator, stock and tank. Others are cars built and designed by General American. Our engineers have never been asked to build a car that was not successfully constructed. Today General American cars carry such diverse things as helium gas, fresh fruit, molten metal, milk, caustic soda . . . the list is almost endless. No matter what you are shipping General American can build a car to carry it in bulk.

The leasing and building of railroad cars is only one phase of General American's vast diversified activities. It also maintains a large public export terminal at New Orleans for the handling and storage of all kinds of bulk liquids as well as operating an extensive European freight transportation system. The largest organization of its kind in the world, General American is playing an impelling and indispensable part in the transportation of the essentials of life. *Address Continental Illinois Bank Bldg., Chicago.*



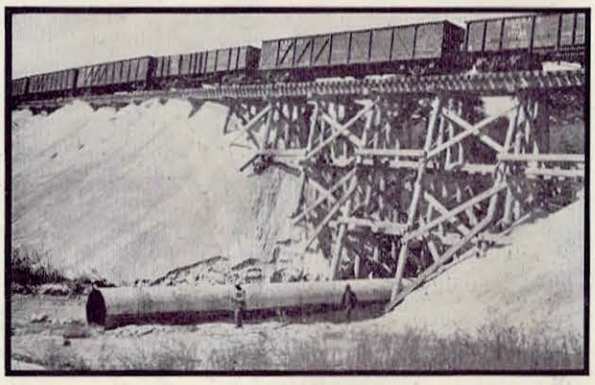
GENERAL AMERICAN TANK CAR CORP.

"A RAILROAD FREIGHT CAR FOR EVERY NEED"

THIS IS ONE OF OUR NATIONAL MAGAZINE ADVERTISEMENTS TELLING PEOPLE THAT A RAILROAD FREIGHT CAR CAN BE BUILT FOR "EVERY NEED."

Maintenance Men with an eye to Economy, Favor

CULVERTS THAT RESIST EROSION



Replacing a 250-foot trestle with 66 inch Armco Paved Invert Pipe under a railroad in Georgia

THAT'S why America's progressive railroads are rapidly replacing worn out drainage structures with culverts of Armco Paved Invert Pipe.

From an economy angle, the advantages are these:

1. Erosion of the culvert invert is effectively resisted.
2. The service life of the culvert is materially lengthened.
3. Safety of roadbed is assured at lower cost per year.

Basically, Armco Paved Invert Pipe is Armco Corrugated Pure Iron Pipe which has an unequaled record to date of 25 years' service under the railroads of America.

Armco Paved Invert Pipe now has a background of six years of service tests in "Nature's Laboratory." Here, in the final test for any product, it has proved its ability to resist Nature's most destructive weapon—EROSION. Furthermore, it has proved the true worth of the paved invert principle and application as developed exclusively by Armco.

Latest engineering data, explaining in detail, laboratory and field tests of ARMCO Paved Invert Pipe, are now available on request.

ARMCO Paved Invert PIPE

Armco culverts and drains are manufactured from the Armco Ingot Iron of the American Rolling Mill Company and always bear its brand.

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*

THE MEMBERS OF THE - ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS operate on a definite foundry program, and meet the A.R.A. Specifications for Chilled Tread Wheels. *Chilled Tread Wheels Carry a Service Guarantee.*

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1928
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Louisville Car Whl. & Ry. Sup. Co.
Bass Fdry. & Mach. Co.
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Pullman Car & Mfg. Corp.
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Griffin Wheel Co.
Dominion Wheel & Fdries. Ltd.
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New York Car Wheel Co.
New Orleans Car Wheel Co.
Reading Car Wheel Co.
Marshall Car Wheel & Fdry. Co.
Lobdell Car Wheel Co.
Maryland Car Wheel Co.
Canadian Car & Fdry. Ltd.
Albany Car Wheel Co.
Hannibal Car Wheel & Fdry. Co.
Mt. Vernon Car Mfg. Co.
Ramapo Fdry. & Wheel Works.
Tredegar Iron Works
Dickson Car Wheel Co.

THE MEMBERS OF THE - ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS operate 57 plants that are conveniently located to the various railway shop centers. These plants have a total daily capacity of 20,000 wheels.

TODAY'S standard of wheel economy and safety is the single plate Chilled Tread Wheel of TODAY.

Better Every Year

A slogan and a fact based upon definite laboratory and foundry programs.

FOR THE 70-TON CAR THE 850-LB. CHILLED TREAD WHEEL—THE HEAVIER THE CAR CAPACITY THE GREATER THE FACTOR OF SAFETY.

CHILLED TREAD WHEELS

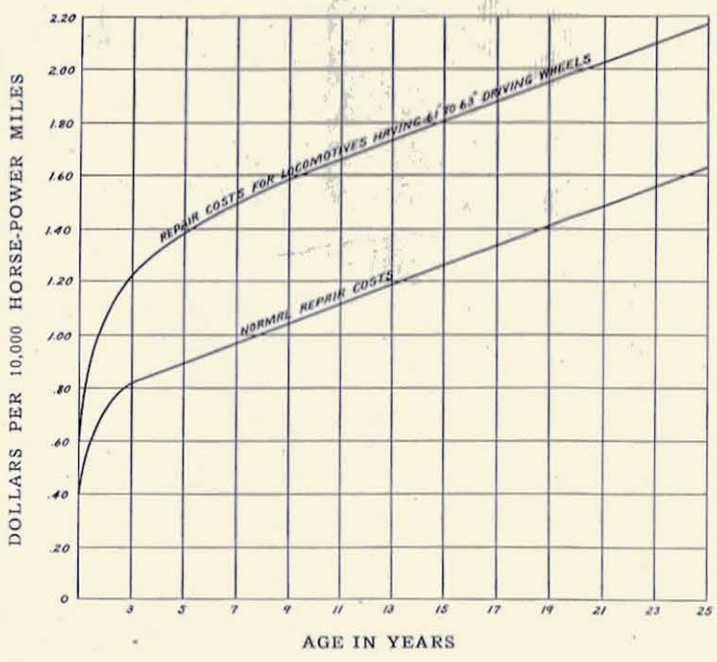
A. R. A. Standards

650-lb. for 30-ton Cars—700-lb. for 40-ton Cars—750-lb. for 50-ton Cars—850-lb. Wheel for 70-ton Cars

ASSOCIATION OF MANUFACTURERS OF CHILLED CAR WHEELS
1847 McCormick Building, Chicago, Illinois

Speed and Tonnage Without Increasing Costs

LACK of operating economy is not confined to locomotives more than ten years old. No matter what their tractive power or boiler efficiency, small driver locomotives cannot successfully meet present schedules without excessive maintenance.



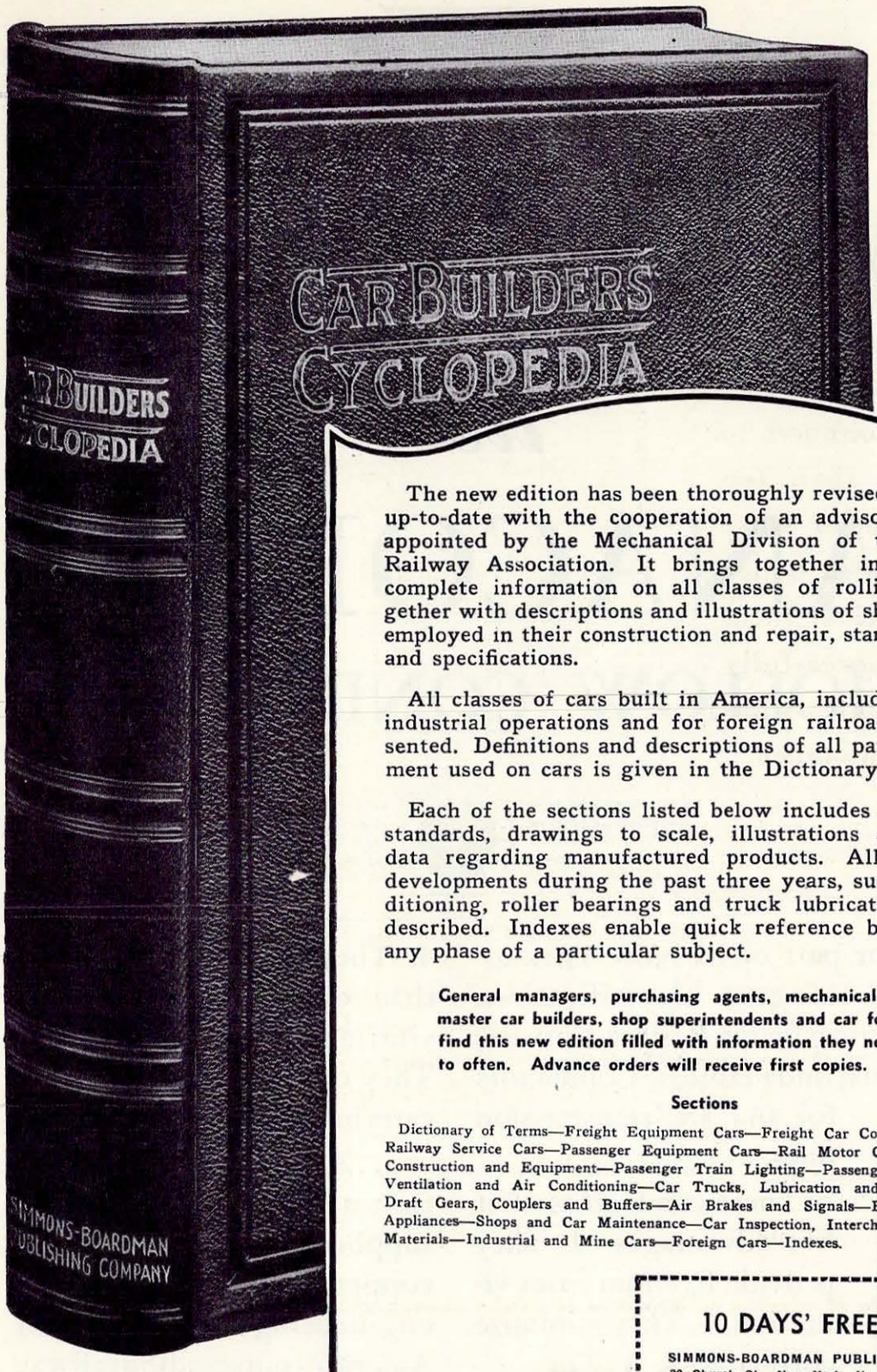
The above chart compares the cost, per 10,000 boiler horse-power miles, of a group of small driver locomotives against the normal cost of other power *on the same railroad*. This shows a repair cost about 50 percent above normal as part of the price of using such power—even though less than ten years old—on present high speed schedules. Another part of this price is costly pounding of the rail, due to excessive piston speed and an inescapable lack of counterbalance.

For such schedules, locomotives capable of SPEED AND TONNAGE with drivers 69 inches in diameter, or larger, are required.

It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA



NOW Ready

Thirteenth Edition

The new edition has been thoroughly revised and brought up-to-date with the cooperation of an advisory committee appointed by the Mechanical Division of the American Railway Association. It brings together in one volume complete information on all classes of rolling stock, together with descriptions and illustrations of shops and tools employed in their construction and repair, standard practice and specifications.

All classes of cars built in America, including those for industrial operations and for foreign railroads, are represented. Definitions and descriptions of all parts and equipment used on cars is given in the Dictionary of Terms.

Each of the sections listed below includes specifications, standards, drawings to scale, illustrations and technical data regarding manufactured products. All of the new developments during the past three years, such as air conditioning, roller bearings and truck lubrication, are fully described. Indexes enable quick reference being made to any phase of a particular subject.

General managers, purchasing agents, mechanical engineers, master car builders, shop superintendents and car foremen will find this new edition filled with information they need to refer to often. Advance orders will receive first copies.

Sections

Dictionary of Terms—Freight Equipment Cars—Freight Car Construction Details—Railway Service Cars—Passenger Equipment Cars—Rail Motor Cars—Passenger Car Construction and Equipment—Passenger Train Lighting—Passenger Train Heating—Ventilation and Air Conditioning—Car Trucks, Lubrication and Roller Bearings—Draft Gears, Couplers and Buffers—Air Brakes and Signals—Brake Gears—Safety Appliances—Shops and Car Maintenance—Car Inspection, Interchange, Loading—Car Materials—Industrial and Mine Cars—Foreign Cars—Indexes.

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City ..... State .....

Position ..... Company .....

(This offer is limited to the United States and Canada) R.A. 9-12-31

Pennsylvania Railroad *uses* ANACONDA HOLLOW CONDUCTORS

Cross-section of Anaconda Hollow Conductor having a H-D copper conductance of 250,000 cir mils; I-beam core of

copper surrounded by single layers of 14 copper wires. Outside diameter, 0.73in. Minimum breaking strength, 10,820 lbs.

ANACONDA
from mine to consumer

For part of its New York-to-Washington electrification, Pennsylvania Railroad is using Anaconda Hollow Conductors for 132 kv. transmission lines.

These conductors offer five advantages—1. They provide freedom from vibration; 2. They minimize corona loss; 3. They reduce skin effect losses; 4. They dissipate more heat than ordinary cables under similar conditions; and 5. They offer increased current-carrying capacity.

...Again Anaconda continues its record of having supplied cables of copper and copper alloys and contributed engineering assistance for America's outstanding railway electrification projects.

For Freedom from VIBRATION TROUBLES
Use Non-Ferrous Non-Corrosive
ANACONDA
Wire and Cable Conductors

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Invested Dollars Quickly Yield More Ton Miles per Train Hour

Centralized Traffic Control on the Sante Fe
Train movements expedited on section of busy single-track
New type of plant expedite requirements
Delicate data on power requirements
By G. E. Thomas
Burlington Completes Centralized Traffic Control on 24 Miles of Single Track
Two interlockings eliminated—Delays shortened—Running time reduced—Savings of 10 per cent
By W. F. Zinn
Railway Signaling
Centralized Traffic Control on 40 Miles of the Southern Pacific
Estimated expense of $2,500,000 for second track deferred by increased utility of present facilities
Southern Pacific Installs Centralized Control on Section of Busy Single-Track Line
Train movements directed by the signal indications
Erie Increases Track Capacity on Busy Section of Double Track
New mechanical plant and centralized traffic control installation solve problem
Signal Indications Direct Trains on the Paducah & Illinois
Entire railroad, involving five junctions and bridge over the Ohio River, included in dispatcher-controlled system
By J. H. Schubert
ILLINOIS
KENTUCKY
Ohio River
Pennsylvania Installs Centralized Control on 30.3 Miles of Single Track
Twelve minutes saved on each freight train stop—Second tracking deferred
First installation of Union three-wire coded system

CTC Cutting Transportation Costs . . . . .

Centralize Traffic Handles Four
Control Installation Junctions and 17 Miles of Line on B. & M.
Railway Signaling
Centralized Traffic Control Postpones Four-Tracking on Central of New Jersey
Manual Block Signals Controlled Remotely on the Big Four
Pere Marquette Installs Centralized Control Signal System
Railway Signaling
Norfolk & Western Speeds Up Train Operation with Dispatcher Control
Chicago Great Western
Saves $7,000 Annually
by Remote Control of Tunnel Interlockings
Railway Signaling
Centralized Traffic Control Installed on Wabash

Railways in all parts of the country are finding the "Union" Centralized Traffic Control System effective in the reduction of train delays to the minimum. Reduction of delay time on the road results in greater productivity in gross ton miles per train hour and consequently lower costs in the handling of freight. The cost of saving a train hour with the "Union" C. T. C. System is exceptionally low by comparison with the cost of most other improvements to the line, inasmuch as the first cost and the cost of maintenance are only a fraction of those which would apply to additional trackage.

Centralized Traffic Control will quickly begin to bring about a return on the investment. It is an investment in transportation efficiency *which does not have to depend upon enormous increases in traffic before it becomes profitable.* It starts paying dividends now and continues to do so at an increasing rate with heavier traffic. The "Union" C. T. C. system materially increases the capacity of the railroad for handling trains.

Ask our nearest district office to give you details as to how an investment in a "Union" Centralized Traffic Control System on your road will make it possible to reduce operating costs economically and profitably.

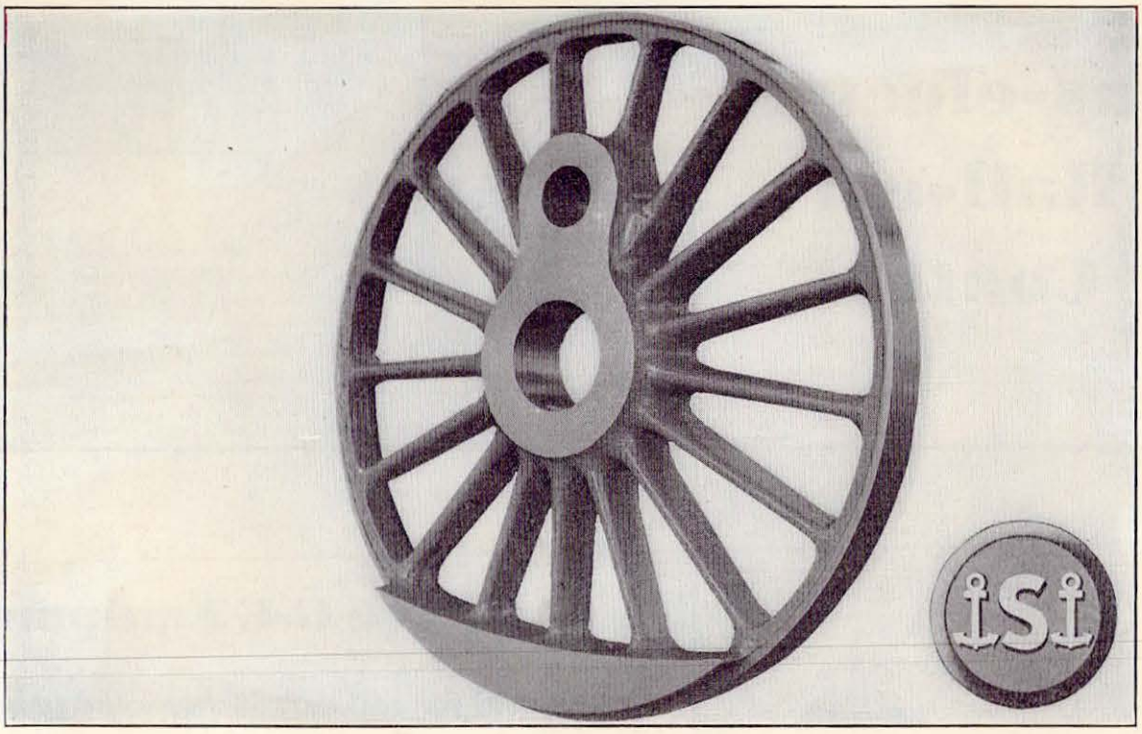
1881 TRADE MARK **Union Switch & Signal Co.** TRADE MARK 1931

SWISSVALE, PA.

NEW YORK MONTREAL CHICAGO ST. LOUIS SAN FRANCISCO

UNION

"STANDARD" STEEL CASTINGS



(Specification S-302-31)

EACH of these castings are microscopically tested before being shipped. The new specification makes an ideal steel for crossheads, wheel centers, driving boxes, cylinder heads and other miscellaneous castings. The steel is made by the acid open-hearth method, and after cooling below the critical range of temperature, is normalized and tempered.

Tensile Strength ...	85,000 lbs.	Elongation	22%
Yield Point	50,000 lbs.	Reduction	35%

While this steel contains no alloys, it provides practically all of the properties of an alloy steel casting at but little more than the cost of our regular steel castings and at considerably less cost than an alloy casting.

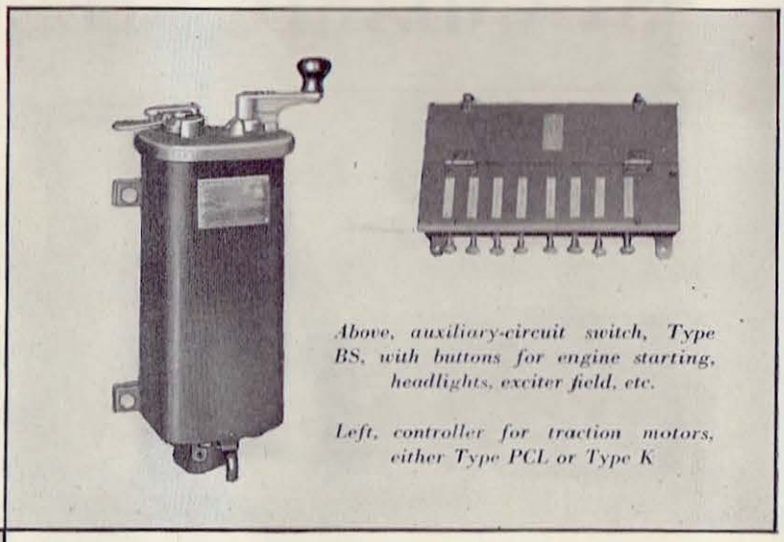
+ + +

STANDARD STEEL WORKS COMPANY

GENERAL OFFICES & WORKS: BURNHAM, PENNA.

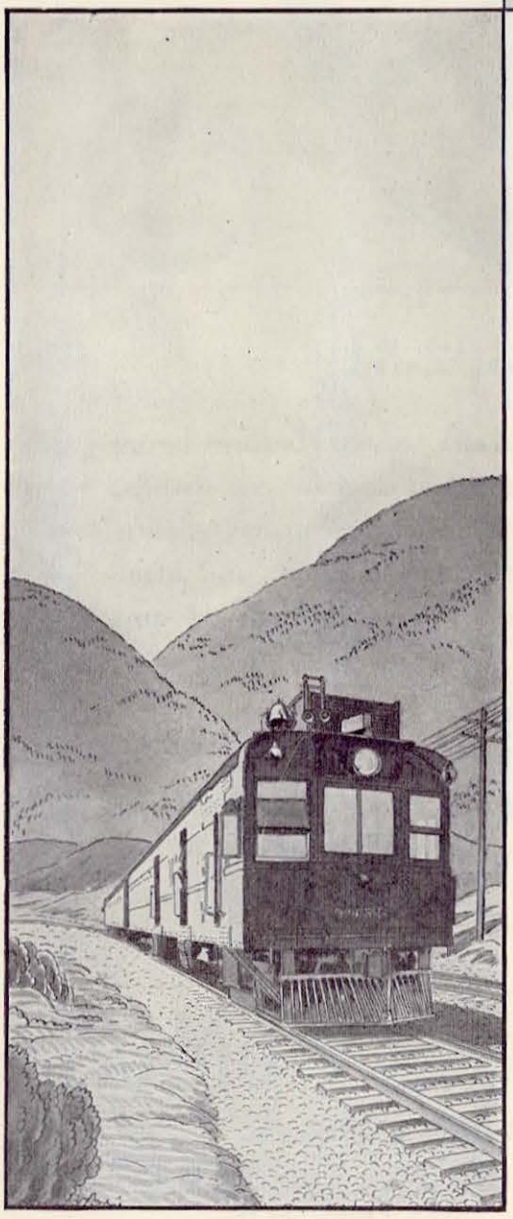
CHICAGO NEW YORK PHILADELPHIA ST. LOUIS
AKRON PORTLAND SAN FRANCISCO

Gas-electric Rail-car Control



Above, auxiliary-circuit switch, Type BS, with buttons for engine starting, headlights, exciter field, etc.

Left, controller for traction motors, either Type PCL or Type K



Part of a Complete G-E Equipment

G-E control for rail cars includes the switches, contactors, and cable necessary to control and regulate the electric power transmitted from the generator to the traction motors. To meet every requirement of maintenance and operation, two kinds of control are available—direct and remote. And like all other parts of G-E rail-car equipment, G-E control has proved its value in the service of railroads throughout the United States and in foreign countries. That is why a large majority of the gas-electric rail-cars in service are G-E equipped. General Electric Company, Schenectady, N. Y.

Join us in the General Electric program, broadcast every Saturday evening on a nation-wide N.B.C. network

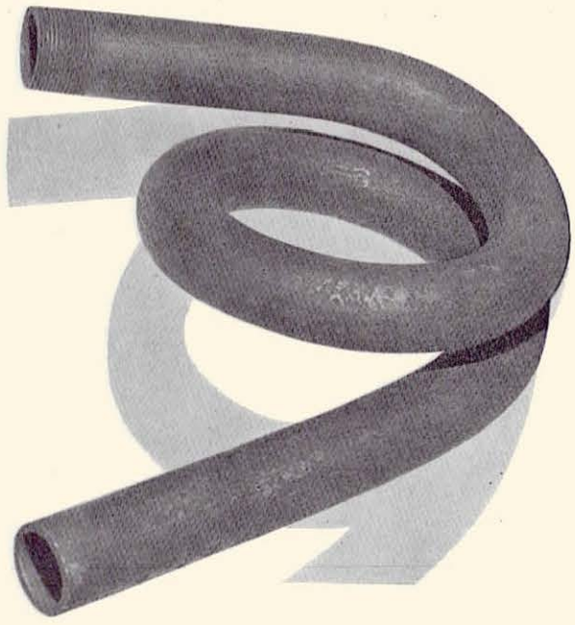
391-46

GENERAL ELECTRIC

RAILROAD EQUIPMENT

THE VALUE OF WROUGHT IRON IN RAILROAD SERVICE HAS REACHED

a new Curve!



That's what we mean—curve!

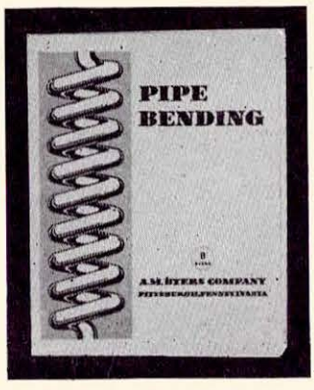
Byers Wrought Iron Bending Pipe makes possible many new curves in this metal so long established in railroad favor. It means economy. It means service. It solves the problem of installations requiring difficult hand or machine bending.

In the prevention of corrosion and vibration-fracture, wrought iron has long been a railroad ally. Railroad men themselves were the first to suggest how much more valuable wrought iron would be if it possessed more bendability.

The suggestion was enough to start us working towards the development of this desired characteristic. It has always been a Byers policy to cooperate with the railroads in every possible way in the solution of their problems. And of course these problems have been extended by modern demands. Likewise, the facilities of our organization were extended and all our experience utilized in producing a bending pipe to meet this increasing railroad need.

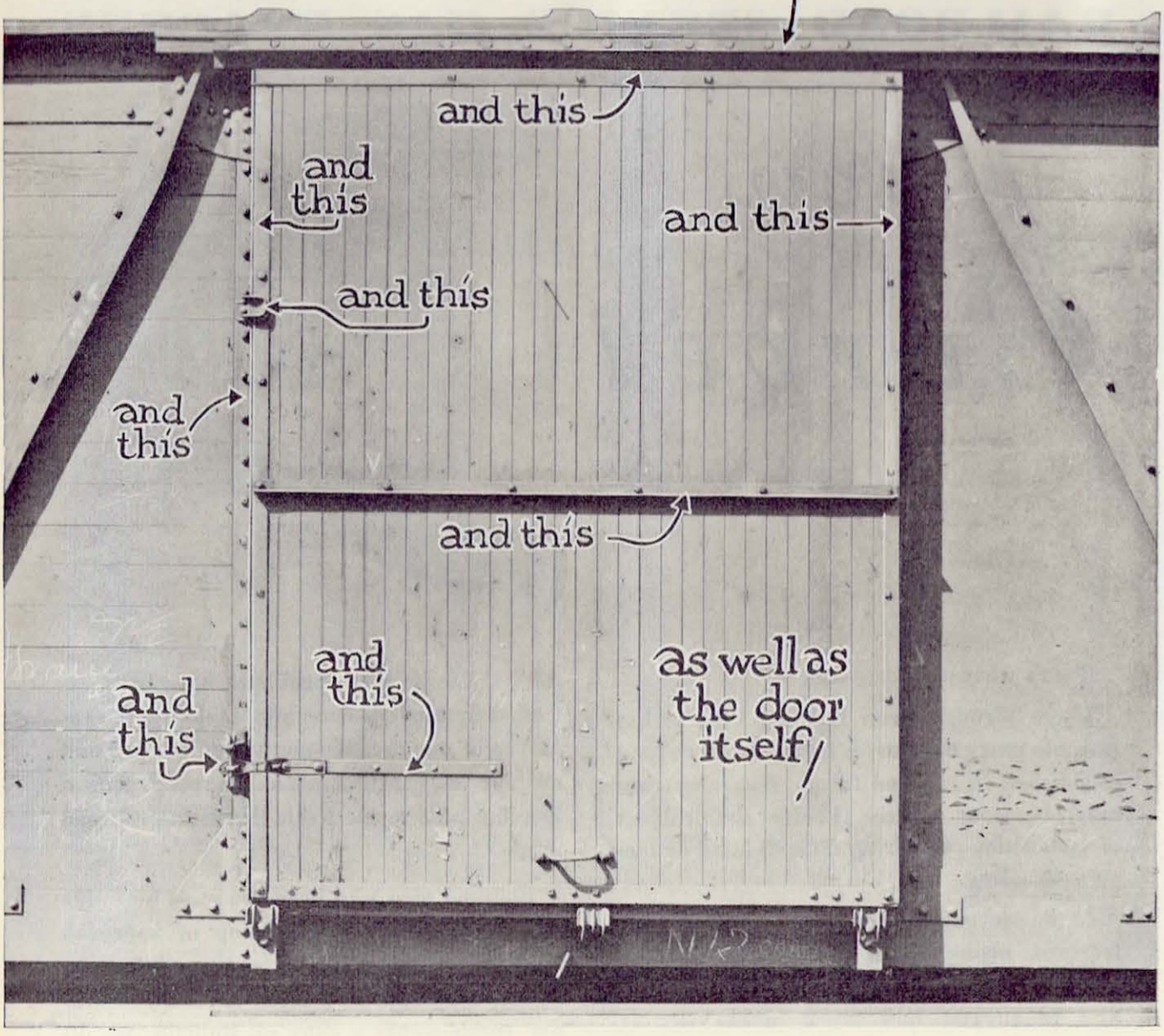
Railroad men who have used this new pipe have placed on it their stamp of approval. Such endorsement is the outcome of experience. We would be pleased to send you with our compliments a copy of Bulletin No. 50 which tells the complete technical story of this new wrought iron bending pipe. A. M. Byers Company, Pittsburgh, Pa. Established 1864.

SEND FOR A COPY



BYERS GENUINE WROUGHT IRON BENDING PIPE

WE UTILIZE THIS



All these old parts are usable in converting fixtures to the modern

CRECO BALL BEARING TYPE

This results in greatly improved operation at slight cost

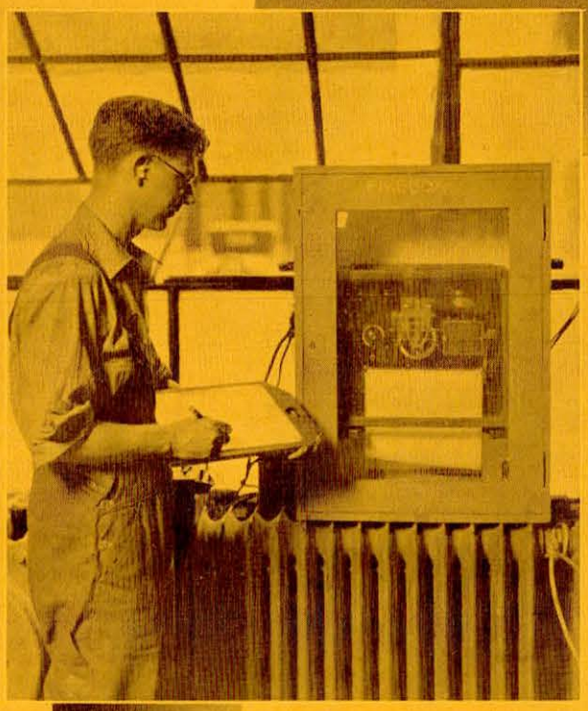
Write for Estimate

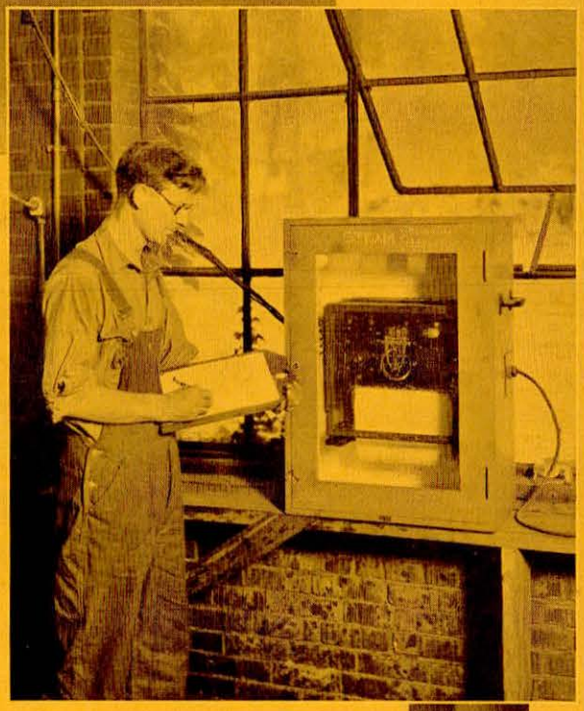
CHICAGO RAILWAY EQUIPMENT CO. - Chicago

SYPHONS

Increase Boiler Efficiency

8.47%



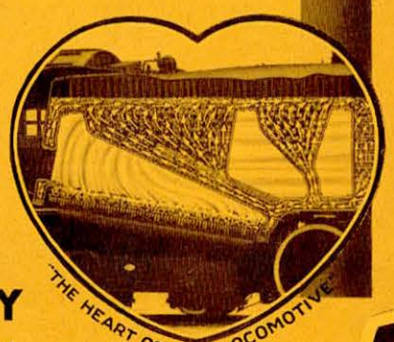


IN THE University of Illinois tests which established definitely that Syphons increase boiler efficiency 8.47%, detailed records were kept before and after Syphon installation. Here (left) firebox temperatures below and above the arch were recorded at four rates of firing. Also at each rate of evaporation steam temperatures were taken in branch and exhaust pipes.

•

An interesting finding is contained in the following extract of the University's Bulletin No. 220, page 44; "the superheat produced with and without Syphons was substantially the same."

CIRCULATION ◆ SAFETY
ECONOMY



LOCOMOTIVE FIREBOX COMPANY

NEW YORK CHICAGO MONTREAL

10 SERVICES Contributing to Efficiency in Operation and Maintenance

The name Dearborn has risen to world-wide fame during the last half century, because of the effectiveness of the services here described. Use these services—all of them, and know that the results you desire will be accomplished completely and economically.

Scientific Water Correction

Water supplies are analyzed in the Dearborn Laboratories. Scientifically correct treatment is supplied to overcome scale formation, foaming, pitting and corrosion. In this work, the Dearborn Chemical Company offers the most comprehensive service in the world, backed up by scientific laboratory control, which adjusts treatment as needed to correct variations which may occur in content of impurities.

Dearborn Treating Plants

These inexpensive plants supply Dearborn Treatment to the water with mechanical accuracy. They treat water at half the cost of lime soda systems. Operate automatically on pressure from water main. Occupy but a few feet of floor space.

Cleaning Scaled Equipment

Dearborn Special Formula No. 134 is used widely in removing carbonate scale deposits of any thickness from water lines, cooling jackets, heaters, coils, pumps, evaporators and equipment of all types. Rapid. Thorough. Easy to use. Economical. Eliminates the danger of acid.

Scale Prevention—Heaters—Injectors

Dearborn Formula 103 and an associated series of formulae give excellent results in keeping feed water heaters, boiler feed pumps, injectors, branch pipes and boiler checks free from scale. Introduced in the tender, it reacts with scale forming salts and prevents their deposit.

"THE ROUGH RIDER" (From Punch, London)

In 1887 when Theodore Roosevelt had just been defeated in an election for Mayor of New York City and Woodrow Wilson was still an associate professor at Bryn Mawr College, the Dearborn Laboratories pioneered in the chemical analysis of water supplies in overcoming boiler water troubles. In the vanguard of progress, year after year since that time, the Dearborn Laboratories have been engaged in this and additional work with results of constantly increasing effectiveness.

Water Systems

Special treatment is provided to prevent scale formation or corrosion in hot or cold water circulating systems. This applies even to drinking water.

Protecting Laid Up Power

The damage that occurs in laid up locomotive boilers to sheets and flues is caused by condensation in the presence of oxygen. The efficient methods of protection provided by this company are adapted as required to the conditions encountered.

Rust Prevention

NO-OX-ID, the original rust preventive, provides both chemical and mechanical protection. It is in use by over 150 railroads and marine interests, and is also protecting thousands of miles of buried pipe line. Manufacturers and users of all types of steel equipment have adopted it.

NO-OX-ID Fillers

Red—Gray—Black—For use in riveted seams in steel car construction, preventing rust, and presenting a drying surface where exposed to the air, to receive paint.

NO-OX-ID Locomotive Front End Coating

Of high viscosity,—leaves a good protective film under heat conditions.

A Series of Cleaners

Dearborn Cleaners are thorough and economical. Specify No. 4 for cleaning car floors. A cleaner for every service.

+ + + + + + + + + + + + +

Every Dearborn Service is as reliable as the one with which you are most familiar. Inquiries are welcomed. Recommendations made without charge.

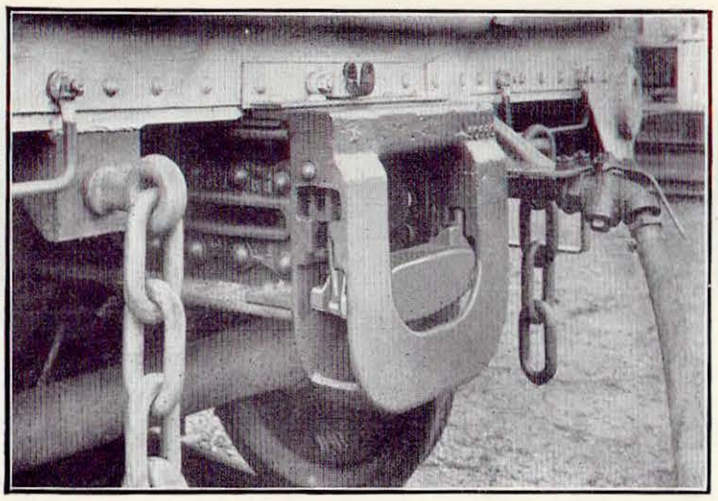
DEARBORN CHEMICAL COMPANY

310 S. Michigan Avenue, CHICAGO 205 E. 42nd Street, NEW YORK

Canadian Office and Factory: TORONTO

Dearborn

TRADE MARK REGISTERED



Advantageous Substitution

Bolts, nuts, pins and cotters have their uses, but where the same functions can be performed by one piece which cannot become lost, an advantage is obtained. The carry iron of the Union Centering Device is supported on reversible drop forged links, alike at both ends and interchangeable with each other.

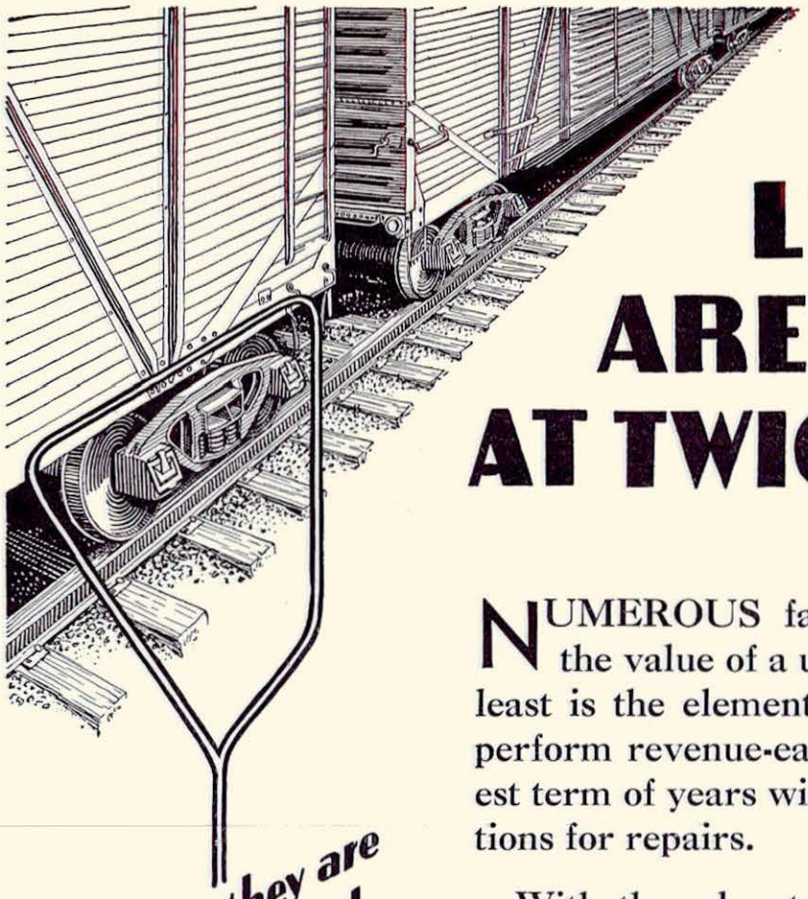
Union Metal Products Company

New York Chicago
Kansas City Washington
St. Louis Houston
San Francisco
Richmond
Montreal

BETTER DRAFT GEAR PROTECTION *For Every Car*

INSURES reduced maintenance cost per car per year. Let us explain.

CARDWELL WESTINGHOUSE CO.
332 South Michigan Avenue
CHICAGO, ILL.

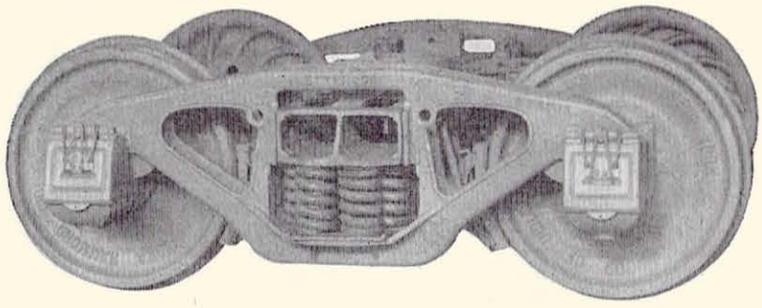


CARS LIKE THESE ARE YOUNGER AT TWICE THE AGE

NUMEROUS factors combine to establish the value of a unit of rolling stock. Not the least is the element of long life—the ability to perform revenue-earning service over the longest term of years with the minimum of interruptions for repairs.

With the advent of the Bettendorf Dalman-Type Truck the normal earning life of rolling stock has appreciably lengthened. No more destructive, joint-loosening, material-fatiguing road shocks through the medium of solid or broken springs. Instead, the Bettendorf Dalman-Type has ushered in an era of easy riding, spring cushioned freight haulage. The best of the modern freight cars are so equipped.

Because they are equipped with BETTENDORF Dalman-Type Trucks

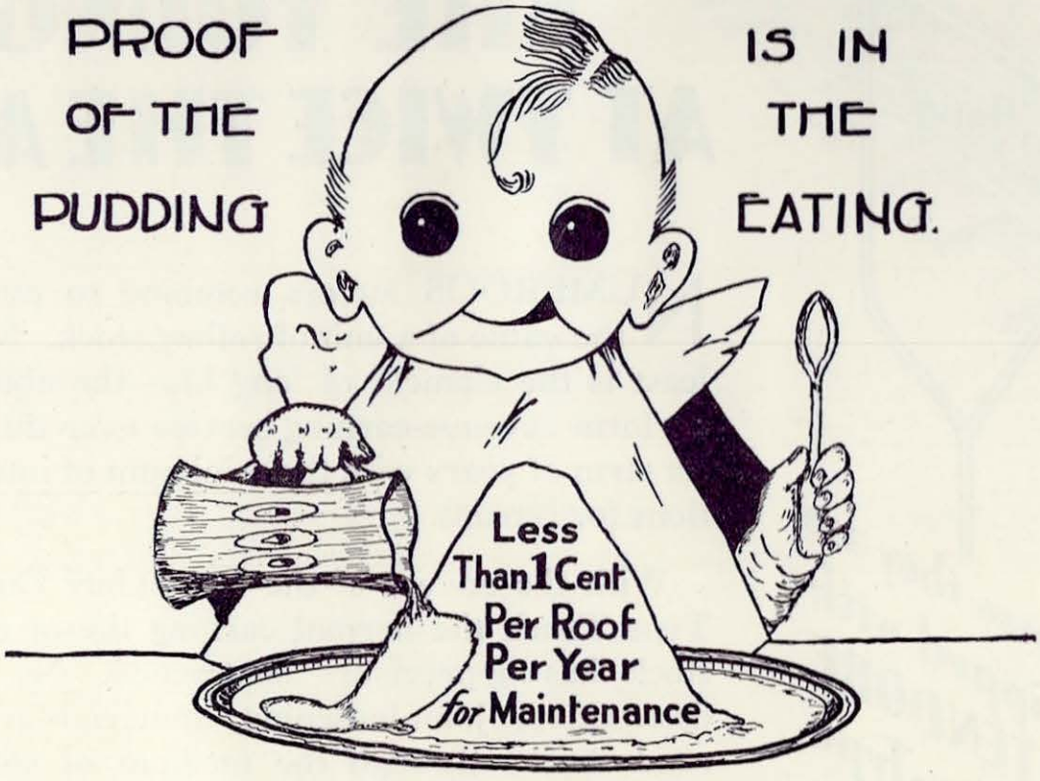


The Dalman feature adds two standard coils to each spring group.

THE BETTENDORF COMPANY

OFFICES AND WORKS BETTENDORF, IOWA

LONG LIFE LOW MAINTENANCE



WHEN it comes to proving the long life and low maintenance of the Dry Lading Roofs, the best evidence you can get is years of actual records.

Study this one. The cost of roof maintenance, from 1913 to 1930 inclusive on 30,000 Canadian National cars equipped with Dry Lading Roofs, amounted to $4519.49. The average maintenance expense, during this 18 year period, amounted to less than one cent per roof per year.

This performance record, extending over 18 years and covering 30,000 cars, demonstrates without question the great economic value of the Universal Dry Lading Roof.

And the reward is pretty sweet.

Hutchins Car Roofing Company

RAILWAY AGE

The Rate Case and Maintenance of Wages

When the Interstate Commerce Commission makes its decision on the petition of the railways for a general advance in freight rates it will decide more than the question of an advance in rates. It will decide also whether there must be reductions of railway wages, and in large measure the fate of President Hoover's entire policy of maintaining wages during the depression.

The commission has excluded testimony regarding wages. It is only too plain, however, that either freight rates must be advanced or wages reduced. In the first seven months of 1931 the operating expenses of the Class I roads were $642,000,000 less than in the first seven months of 1929, and $409,000,000 less than in the first seven months of 1930. Despite the drastic retrenchments made, the net operating income earned was only $295,000,000, or at the annual rate of return of but 2.19 per cent on property investment. There is as yet no tendency of traffic to improve. Therefore no increase in total earnings can reasonably be expected from that source in the near future.

Net Earnings Must Be Increased

The margin between income and outgo must, however, be increased, either by an increase in total earnings or by further reductions of expenses. Such retrenchments as already have been made by curtailing employment and purchases cannot be increased on most railways without serious injury to the properties and service. The only remaining available means of substantially reducing expenses is to reduce wages. Unquestionably, therefore, if the commission refuses to grant an advance in rates, or authorizes only an inadequate advance, railway managements will be forced immediately to seek reductions of wages.

The effects produced by a movement of the railways to reduce wages would be most interesting and important. This is the first depression in history during which a general policy of maintaining wages in private industry has been tried. The policy was initiated by President Hoover at conferences with business leaders which he called in the latter part of 1929. The purpose was to shorten and prevent deepening of the depression. As a result of these conferences a genuine effort was made for months by most business concerns to maintain wages. In spite of this and all other efforts to stimulate business the depression has steadily grown worse, and has become one of the longest in history. Every business and industry must finally pay wages out of earnings, and as the earnings of most business concerns have declined the number of reductions of wages has increased until it is probably correct to say that the wages of 1929 are now maintained in comparatively few major industries.

The question of reducing wages in these industries is constantly being given more consideration and discussion. The leaders in each of them are hesitating about taking action, preferring to let the leaders in the others act first. The starting of a movement by the railways for reductions unquestionably would be quickly followed by the starting of movements for reductions in other important industries. Probably, if the commission, by refusing the railways an adequate advance in rates, should force them to seek reductions of wages, its decision in the rate case would mark the beginning of the final breakdown of the entire policy of trying to maintain wages during the depression.

An Agreement to Maintain Wages?

It might be said that a movement of the railways for a general reduction of wages would violate an agreement made by their executives almost two years ago to maintain them. The emergency board appointed by President Hoover last April to investigate the wage controversy between the Louisiana & Arkansas and its shop craft employees referred in its report to the "policy announced in the statement of the President on November 21, 1929, after conferences with employers and employees, to the effect that there should be no wage reductions made by employers and no efforts by the men to increase the standard wages". No railway executives participated in the conference with the President on November 21. A small group of railway presidents, mostly from eastern territory,

have a conference with him on November 19, following which a statement was issued from the White House indicating that these railway executives were unanimous in their determination to co-operate in the maintenance of employment and business progress. After a meeting of the Association of Railway Executives in Chicago later in the same week a statement was sent to the President advising him that it was the "hope and expectation (of the railway executives) to proceed on at least a normal basis in their future capital and maintenance expenses", and that, in fact, "a movement to increase them has been started and is being actively and intelligently pressed forward". It is highly questionable whether it can accurately be said that there was anything more than a tacit understanding that the railways would try to maintain wages.

However that may be, they actually have maintained them for almost two years, and there certainly was no agreement to maintain them throughout the depression, no matter how long it might last or how much the earnings of the railways might decline. Another fact which cannot be disregarded is that President Hoover's policy contemplated avoidance of demands for both reductions and increases of wages, and that the railway labor leaders have announced a program in contravention of this policy. They have announced that they will ask Congress at its next session for legislation to establish a shorter working day and working week on the railways. As unquestionably it is their purpose to seek this legislation in a form that would maintain the present weekly and annual earnings of each class of employees, it follows that they intend to seek legislation to increase the hourly wages of all employees. They are thus setting railway executives the example of disregarding President Hoover's wage policy.

Rates, Wages and Solvency

Should railway wages be reduced if railway rates are not adequately advanced? This question, and the question as to whether railway wages are too high, are two entirely different questions. Without discussing whether railway wages are too high, as measured by other standards, it may be stated as beyond reasonable question that railway wages are now too high as measured by the present total and net earnings of the railways. The management of no business concern or industry can assume the responsibility of indefinitely paying wages higher than are compatible with maintenance of the solvency of that concern or industry. Railway managements are trying to maintain both present wages and the solvency of the railroads by seeking a general advance in freight rates. If the Interstate Commerce Commission refuses to help them adequately to increase their earnings by authorizing an advance in rates, they will have to seek a reduction of wages, even though it is practically certain that the result will be movements for reductions of wages in most major industries.

Self preservation is the first law of nature, and no economic theory or argument can prevail against it. Although the commission has properly excluded testimony regarding wages from the rate hearings, there can be no evading of the fact that in deciding the rate case it will decide whether railway wages must be reduced.

Coal an Ideal Fuel

In an editorial hailing the completion of the 1000-mile natural gas pipe line from Texas to Chicago, the New York Times, in conclusion, says:

> So confident are the utility companies that within a few years the country will be enmeshed in a pipe-line system which will extend from Mexico to Canada and from the Atlantic to the Pacific. That will do more than drastic legislation to reduce the pall of smoke that now hangs over industrial communities and with it the bills of the doctor, laundry man and house painter.

In an article in the *Railway Age* of December 13, 1930, C. V. Beck, a coal operator and a close student of combustion problems, analyzed the situation with regard to competing fuels with the conclusion that, on a basis of heat unit, coal is cheaper at the mines than is natural gas at the wells, and that heat units move more cheaply by rail in the form of coal than they do by pipe line in the form of gas. This conclusion he supported by detailed engineering data and so far no one has seriously attempted to attack either his data or his conclusion. The fundamental economic strength of coal thus appears well established.

In spite of this, however, natural gas still makes headway in its battle with coal, and a reference, such as that of the New York Times, to the appalling smoke nuisance of our great cities must awaken considerable sympathy even on the part of close friends of the coal industry. What can the coal industry and the coal carriers do about it? This question Mr. Beck sets about to answer in an article in the *Railway Age.* of September 5. We commend it to the thoughtful attention of all railroad men whose companies depend upon coal for a substantial part of their revenues.

Mr. Beck emphasizes the point that coal suffers because it burns so easily in outmoded equipment whereas natural gas installations involve modern equipment, securing a high degree of efficiency in use combined with a maximum of convenience. The prospective gas patron makes a decision in its favor, not by comparing modern gas equipment with modern coal burning equipment, but too often without the knowledge that there is any such thing as a convenient, smokeless and automatic method of deriving heat from coal. The efficiency and convenience of modern gas installations, Mr. Beck contends, is obtainable with modern coal-burning devices—but the coal industry has not made that fact generally known, whereas the convenience of gas is constantly dinned into the ears of the public by a well-organized industry awake to the value of advertising and publicity.

The salvation of the coal industry and the coal carriers, in his opinion, lies in a similar campaign to show the public that they can get the same convenience from modern coal-burnng equipment that they can from gas—and, in territory where coal mines are nearer than gas wells, at a much lower cost.

Truck Shippers Add To Taxpayers' Growing Burden

Two communications published in a recent issue of the Wall Street Journal comment vigorously, the one on the present situation of the railroads and the other upon general economic conditions. The first exemplifies strikingly the kind of muddled thinking on transportation which continues to mislead so many of our business and public men. The second forcefully suggests the inevitable economic disaster which must follow action based upon such thought processes. The first letter comes from Lincoln, Nebr., and expresses the belief that "deep down in his heart" the editor of the Wall Street Journal must agree that a 15 per cent increase in freight rates will mean that the "death knell is finally sounded" for the railroads. The writer tells of truck movements of machinery and fourth-class-freight-rate castings from Kansas City to Lincoln, 240 miles, and of machinery from Kansas City to Chicago. He concludes as follows:

> Whether it pays the truckman, that does not interest us in the least. We consider him just the same as any other business man, able to take care of himself, and if he goes bankrupt it has been our experience he is just like any other business man, he has some successor ready to take his place and take his chance on whether he can get by or not, and it is only through this process of elimination of unsound business men that our country has grown to its present standard.

This correspondent, who signs himself "C. D. A.", plainly considers the charges he pays the truckman in the same light as those he pays the railroad, i.e., that they represent the total cost to him of providing the transportation service he receives. Yet it must obviously be clear after even a moment of examination of the surrounding circumstances that this is not true. When the railroad charges are paid, the total costs of the service have been discharged and a substantial contribution has also been made toward taxes for the support of the government. When the truckman's charges are paid, however, the obligation of the shipper or consignee has only begun. He still has his obligation as a general taxpayer to pay for the roadway the truckman uses, and to pave and maintain that roadway. The truckman, it is true, makes some contribution to this expense, but it is, proportionately, a very light one. The greater the volume of long distance trucking on the highways, the more the taxpayers must be assessed. The money paid for transportation service to long-haul truckmen stimulates a service the growth of which requires increased taxation. The money paid to railroads for such service, on the other hand, tends to decrease taxation.

The second letter comes from Fort Smith, Ark., is signed "A. K." and reads in part as follows:

> Yesterday afternoon I visited a 500-acre farm in the vicinity of this city. This farm 10 years ago was mortgaged for $15,000 on a 50 per cent basis. It was offered to me yesterday for $6,000. The income to the owner of this farm last year was $600, while the taxes and insurance on the buildings amounted to $250. This year, with cotton selling as it promises to sell now, 5 cents per pound, with the best prospects of a crop I have ever seen, compared with the worst drought last year in this country in 50 years, the income from this farm promises to be less than $400. This condition is typical. How is the state government going to operate on the reduced income indicated and how is the farming population to live under such conditions?

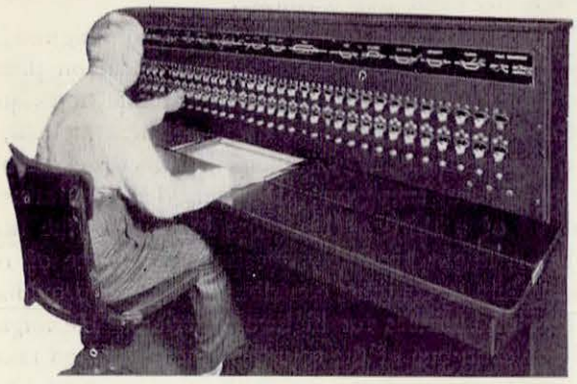
Arkansas has an elaborate system of highways. Last year a total of $38,307,995 was spent on them. The state collected $10,711,232 in gasoline taxes and motor vehicle fees from the users of these highways, leaving a burden of 27½ millions to be met presumably by the general taxpayers. It seems that the farmer, mulcted of a third of his gross income by the tax-gatherer, might profitably question the justice of requiring him to continue contributing toward providing a place of business for highway carriers. He might, if he lives in one of the counties where railroad taxes amount to from a fourth to a half or more of total tax receipts as they do in many localities, begin to wonder how much further his tax assessment would be raised if the railroads should go out of business because of tax-aided highway competition, while highway expenditures were vastly increased to take care of the added traffic they would thereby be forced to handle. He might even go still further and ask why he as a farmer should be forced to pay all his costs of doing business, plus a contribution toward the general expenses of government, while taxation of highway transport does not even cover the expenses which the government incurs for the direct benefit of that industry, with nothing at all left over toward paying for the usual governmental services.

No one has yet been able successfully to deny the fact that railroad transportation is much more economical, *all costs considered,* than that by inland waterway, or by highway over long distances. Society must pay for its transportation in one way or another. If it does not pay in rates then it will have to pay in taxes. The shipper is also a taxpayer. Is it true economy for him to save a dollar in freight charges, when he thereby increases his tax levy and that of his fellow citizens by a much larger amount than he saves in direct freight charges?

The American people last year paid four billion dollars for railroad freight transportation at a cost of about one cent per ton per mile. The total cost to the nation of providing this same service by highway or inland waterway would be from two to five times that amount. If, with such transportation, the shippers should pay only the four billions they now pay, then the taxpayers would have to pay the remainder—which would double or treble the total tax bill—local, state and national. Is there anyone so fatuous as to suppose that national prosperity lies in this direction?

Centralized Traffic Control Reduces Operating Costs

Decreases number of employees—Defers expenditure for additional tracks—Saves fuel—Speeds up train movements



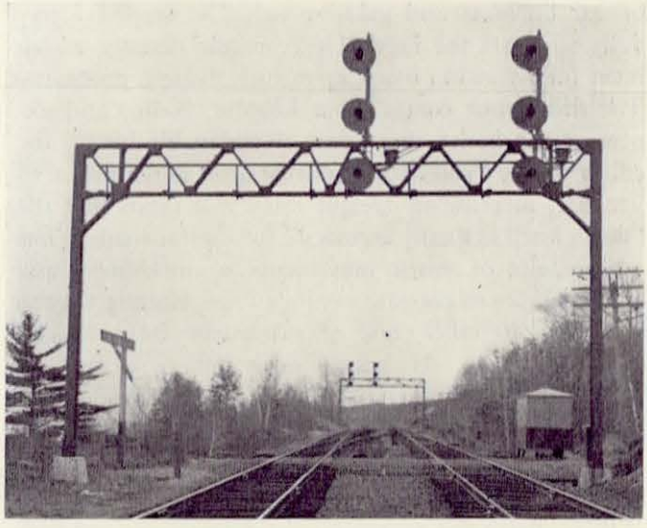
This C. T. C. Machine on the S. P. Makes 37 Miles of Second Track Unnecessary

AN installation of centralized traffic control, where adaptable to conditions on a busy division or a major section thereof, should effect annual savings in operating expenses equivalent to 18 to 24 per cent of the investment, by reason of the reduced number of operators required, and the possibilities of increased train load and the reduction in overtime for train and engine crews. Furthermore, the additional savings realized annually by deferring expenditures for added track facilities range from 10 to 20 per cent of the investment for centralized control. These savings, in addition to many advantages in facilitating train operation and increasing safety, have been definitely proved on over 40 major installations which have been placed in service on both single and multiple-track lines within the last five years. Centralized traffic control is, therefore, coming to be recognized as the most economical and modern method of directing train movements by signal indication without written train orders.

Reduction in Number of Employees

One of the most tangible benefits from an installation of centralized traffic control is the elimination of operators at intermediate block offices, outlying junctions and railroad crossings. In view of the fact that the expenditure for wages for these positions is largely constant, regardless of the volume of traffic, it is evident that the greatest proportionate savings can be made by eliminating such positions in periods of minimum traffic, such as that now prevailing. As a matter of fact, on a certain single-track main line division of a through route, which is now handling a traffic that does not approach its capacity, studies show that a proposed installation of centralized traffic control will be justified by the single item of savings in wages effected by the release of operators.

To be more specific, centralized traffic control has made possible an annual saving in operators' wages alone of $26,950 on a 40-mile section of the New York Central. Likewise, when the Missouri Pacific installed centralized control on 43 miles of single track between Kansas City, Kan., and Atchison, the removal of 3 interlockings and the elimination of 14 operators resulting therefrom enabled an annual wage saving to be effected equivalent to 20 per cent on the investment for the centralized control. Again, on a 37-mile section of single-track on the Wabash, the release of 8 operators is creating an annual saving in wages of $14,000 annually. Likewise, when the Peoria & Pekin Union installed centralized traffic control on 7.8 miles of line, involving 16 track miles, several interlockings and block offices were abandoned, eliminating 14 levermen and operators, with an annual wage saving of $19,347, equivalent to 20 per cent on the investment involved. Again, a 40-mile installation on the Southern Pacific saves about $10,500 annually in wages for operators and station personnel.



Trains Are Operated in Either Direction on Both Tracks on C. T. C. Territory on B. & M.

Postponement of Expenditure for Additional Tracks

Another very definite saving made possible through centralized traffic control is the deferment of large expenditures for additional track facilities. On lines where the volume of traffic exceeds the economic capacity, that is, where the business is being moved over

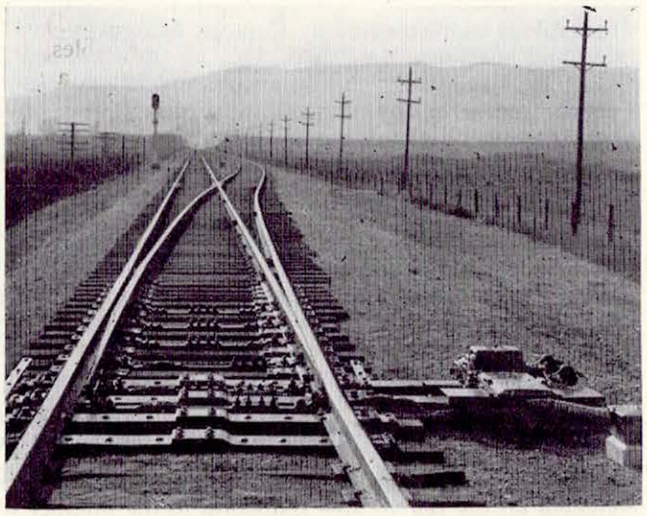
the road but delays are excessive, overtime becomes a large item of expense, many block offices are required, and delivery schedules are not met with sufficient regularity to satisfy shippers. In some cases peak traffic movements cause congestion just at the time when prompt delivery is of most importance. On many such divisions, the physical conditions are such that the addition of another track would necessitate heavy expenditures, and such a program is, therefore, postponed from year to year. Now centralized traffic control offers a solution for such a problem at a moderate outlay.

For example, the Southern Pacific had to handle a peak movement of fruit and vegetables over a 40-mile section of line in California where the installation of centralized control afforded so much relief in the way of improved operation and increased track capacity that a $2,500,000 second-tracking program has been indefinitely deferred. As another example, the estimated cost of constructing a second track, which was postponed by the installation of centralized control, on 40 miles of the Toledo & Ohio Central, was $2,000,000. Likewise, in 1925 the Missouri Pacific estimated that the revision of the alinement and second tracking of the line between Kansas City, Mo., and Osawatomie, Kan., would cost $60,000 per mile, whereas by installing a system of power switches and signaling for directing train movements by signal indication, the heavy traffic has been handled satisfactorily since that time without the second track.

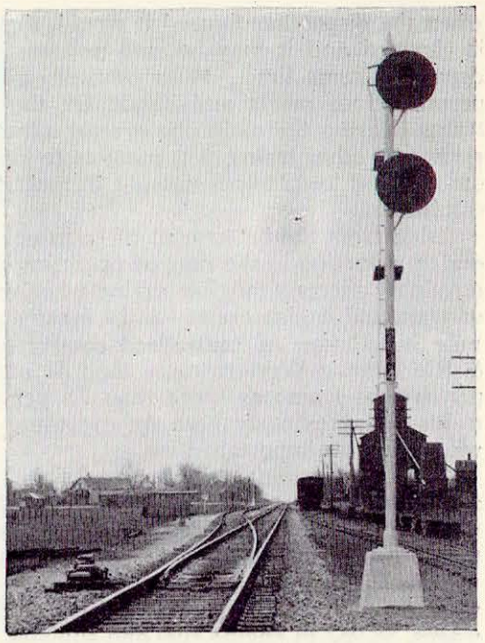
Again, on certain double-track lines the preponderance of traffic is in one direction for certain hours of the day and in the opposite direction during other hours. The use of centralized control for the direction of train movements in either direction on each track makes it practicable to utilize stretches of track that would otherwise be idle, for the movement of trains against the normal current of traffic, and as a result all trains are kept moving rather than some of them being required to wait on sidings. The Boston & Maine has several sections of double track on which centralized control is thus used to advantage. One section on the Fitchburg division includes 76 miles of two and three-track line

Elimination of Stops and Waiting Time

Two important characteristics of a centralized control installation make it possible to save time and fuel.



C. T. C. Saves Over a Minute per Freight Train Mile on the D. & R. G. W.



This Switch on the Wabash Is 93 Miles from the C. T. C. Machine

In the first place the use of power-operated switches reduces the number of train stops at junctions, crossovers and passing-track switches. A series of accurate time-distance checks made on the Big Four showed that the use of a power switch to eliminate the stopping of a tonnage train to enter a siding saved an average of 5 min. 36 sec. for each move, while 7 min. 53 sec. was saved when leaving a siding. With power-operated switches two train stops are eliminated, and if a non-stop meet is made, the entire meet can be completed in from 4 to 6 min. as is being done on the Wabash, the Burlington and other roads with centralized control installations from 4 to 15 times every day. Thus a saving of at least 8 to 10 min. is made on each such movement. On one 40-mile installation of centralized control 90 per cent of the meets are non-stop. Of course, the train which runs through on the main track makes about the same time as before so that the average time saved on typical installations such as on the M. P., the T. & O. C. and the D. & R. G. W. is from 1.4 min. to 1.8 min. per freight-train mile. On the Southern Pacific the running time of freight trains has been reduced 1 hr. 10 min. westbound and 1 hr. 7 min. eastbound over a 120-mile sub-division by the installation of centralized control on a 40-mile section of this territory.

On one installation an average increase of 217 tons was made per train, while the speed was increased 6.5 m.p.h., resulting in a reduction of 59 min. for each freight train on the 42-mile installation. On the New York Central, the saving made possible by a reduction in train delays was computed to be worth $135,850 for one month as compared with a similar month prior to the use of centralized control. On this same territory, the tonnage was increased 2 per cent, using the same locomotives, and this increase, together with the 36 per cent increase in average speed made possible by the centralized control, led to a 39 per cent increase in gross ton-miles per train-hour.

Another important advantage of centralized control operation, which cannot be seen by comparing train times between terminals, is brought about by the ability to start trains out of a terminal or junction when they are ready to go, the system being so flexible that line-ups can be changed on a moment's notice, whereas with train order operation, if a train is not ready to pull out

when the dispatcher figured it would, the entire line-up is changed and it may become necessary to delay the departure some time. With centralized control, which permits close meets and eliminates the necessity for trains clearing the main line several minutes before the arrival of other trains, it is possible to change a line-up quickly and keep trains moving to meet the immediate conditions.

Aside from the betterment of train operation in general, a reduction in the time of operating trains between terminals effects a tangible saving when overtime wages of train and engine crews can be eliminated. On a 32-mile installation of centralized control on the Denver & Rio Grande Western more than 31 min. were saved per freight train; as more than 75 per cent of these trains had previously been on overtime, the saving in wages was an important item.

Again, in certain cases it is possible to make turn-around runs where such were not possible before, as was the case on the Missouri Pacific between Osawatomie, Kan., and Leeds. Mo. Likewise, the Ohio Central installation permits 780 turn-around trips annually, with an annual saving of $14,560, including $2,067 in wages, $8,957 in engine fuel and supplies, and $3,536 in per diem charges.

The fuel saving made possible by centralized control is an important item, fuel being saved by the elimination of train stops, by a reduction in the time previously wasted when waiting for meets or for orders, and by getting the trains over the road quicker thus reducing the total time that fuel is being consumed. To determine the magnitude of this saving, a study was made of a month's operation on a 24-mile centralized control installation on the Burlington where the traffic included eight passenger and six freight trains each way daily. The fuel saved by the elimination of stops for a freight train entering and leaving a siding was calculated to be 500 lb. and 200 lb. for a passenger train, while a locomotive waiting on a siding consumed 200 lb. of coal an hour. For a month after the centralized control was in service, a check showed that 481 freight and 35 passenger train stops were eliminated, which, together with the time waiting on sidings, effected a total fuel saving of 230 tons for the month. This figured at $2.50 per ton, amounted to $6,372 annually. A check on the Missouri Pacific showed that about 15 scoops of coal are saved for each train stop eliminated, and that on the average, four train stops are being eliminated for each freight train on the 43-mile centralized control territory. In other words, about 390 tons of coal are being saved each month, which, figured at $2.50 per ton, totals $9,200 annually. On one of the earlier installations on this same road, the fuel saving was 23 lb. per 1,000 gross ton-miles, totaling over 890 tons for one month.

Results of Proposed Installation Can Be Calculated

The results to be accomplished by a proposed installation of centralized traffic control can be calculated quite definitely because the factors involved are known quantities. The number of operators to be relieved is definite. Time-distance charts can be drawn from data on the dispatchers' sheets and the same trains can then be re-dispatched to show the operation under the centralized control system. When forecasting the result to be made by the T. & O. C. installation, it was calculated that a saving of 67 per cent would be made on the investment, over and above interest charges. The actual results, with reduced traffic in 1930, showed a saving of 65 per cent and the number of trains has increased since that time. These figures include credit for deferring an expenditure of $2,000,000 for second tracking, while the operating savings, excluding this factor of deferred expenditure for additional facilities, run from 18 to 24 per cent on certain centralized control installations now in service. As traffic returns to normal, these percentages will increase rapidly.

In Next Week's Issue

In the short span of about 15 years power tools have been devised for the conduct of maintenance of way operations that had formerly been performed entirely by hand. New appliances are being introduced from time to time, but many devices have long since passed the experimental stage and are demonstrating in actual service their capacity to save money. The time is ripe for an "industrial revolution" in maintenance of way service whereby obsolete methods and forms of organization will be discarded in favor of measures and forms of procedure that will permit of much greater savings through a much more extended use of labor-saving tools.

Accident Bulletin No. 99

THE records of collisions, derailments and other accidents on the railroads of the United States in the calendar year 1930, as compiled by the Bureau of Statistics, Interstate Commerce Commission, and briefly reported in the *Railway Age* of April 18, 1931, page 773, are available now in the final bulletin of 106 pages, 9 in. by 11½ in., made up in the usual form. This bulletin is for sale by the Superintendent of Documents, Government Printing Office, Washington; price 30 cents.

The principal table not touched upon in the *Railway Age report* in April, is the summary of train accidents, Table No. 61. This shows that the cost of train accidents (damage to railway property) was about 17 per cent less than in the preceding year, as follows:

	1930	1929	1928
Collisions	$3,565,107	$4,645,176	$4,755,833
Derailments	10,238,546	13,137,632	13,194,511
Other train accidents	2,157,617	1,592,952	1,608,097
	$15,961,270	$19,375,760	$19,558,441

This table is supplemented by 15 pages of figures classifying and analyzing the causes, etc., of train accidents. Table 67, analyzing miscellaneous train accidents (which, measured by damage done, constitute only about one-twentieth of the train accident record) divides these accidents into 73 classes. Other tables, filling 19 pages, analyze train service accidents in a similar way.

One of the significant charts in the bulletin is that recording the total number of persons killed in train and train service accidents on all steam railways, which shows in a striking way (for ten years) the uniformly large number of "other persons" killed as compared with the totals of passengers and employees killed. These "other persons" consist mainly of the victims of highway crossing accidents and trespassers on tracks and trains.

The editorial portion of the bulletin makes extended comment on the remarkable reduction in the number of employees killed and injured during the last few years.

(*Continued on page 400*)

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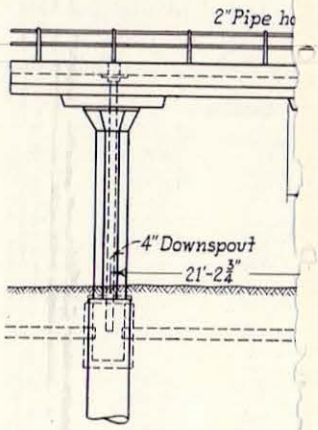

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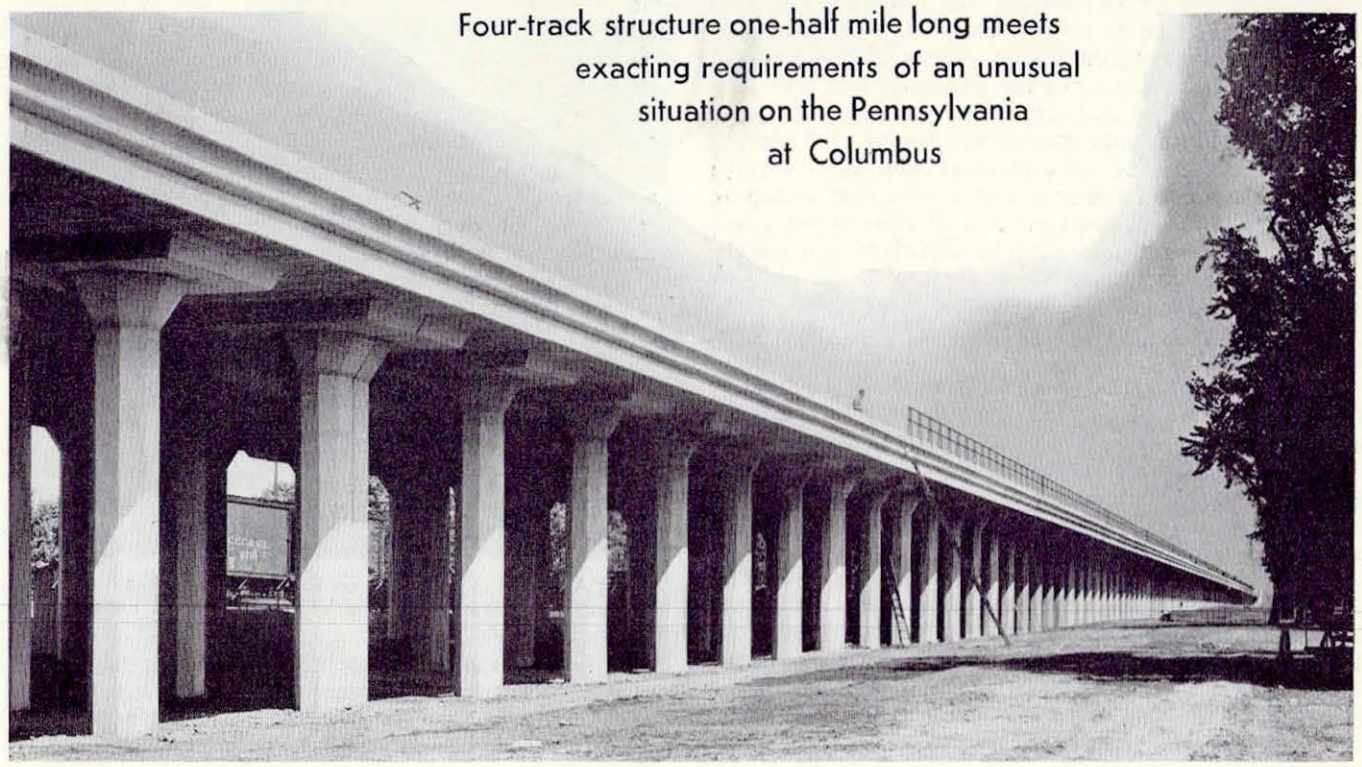
Flat Slab Viaduct Solves Right-of-Way Problem

Four-track structure one-half mile long meets exacting requirements of an unusual situation on the Pennsylvania at Columbus



The Viaduct Is an Impressive Structure

IN ORDER to extend its Grogan yard at Columbus, Ohio, effect street grade separations and secure a ruling grade of 0.3 per cent, the Pennsylvania was confronted with the necessity of relocating one of its lines entering the city, and met the rather unusual requirements that were imposed in the acquisition of needed right-of-way by the construction of one-half mile of reinforced-concrete flat-slab viaduct. This structure, which was built to accommodate four tracks and covers a ground area of nearly 3½ acres, required the placing of 22,000 cu. yd. of concrete containing 2,250 tons of reinforcing steel, and is in many ways an unusual railway structure. It forms a part of a railway terminal project at Columbus that involved an expenditure of approximately three million dollars.

Until the completion of the improvements here described, Grogan yard had a length of about 3,000 ft., its east end being fixed by the grade crossing with the Pennsylvania line to Cleveland and its west end by the sharp curve that was introduced where the line to Sandusky turns off to the north. One of its important functions is the interchange with the Norfolk & Western for which purpose it has a direct connection with the large Norfolk & Western yard just east of the Cleveland line crossing.

Yard Had to be Extended

The principal business handled over the Sandusky line is lake coal received from the connecting lines at Columbus and delivered to coal docks at Sandusky, and as much of this is received in solid trains and forwarded without breakup, the limited length of the Grogan yard comprised a serious handicap in the handling of this traffic. However, to extend the yard at the west end by following the direction of the Sandusky line on the sharp curve to the north would have introduced highly objectionable operating conditions, and the fact that the Pennsylvania already owned trackage, used primarily as industrial leads, extending due west from the yard for a distance of about 2,600 feet to the main line of the Big Four, led to the idea of expanding Grogan yard by extending the tracks to the west.

To carry out this plan, it was necessary to develop a scheme that would provide a connection for the Sandusky line at the proposed extended location of the west throat of the yard, and this gave rise to the plan of abandoning the old location for some distance north of the yard in favor of a new location just east of the Big Four right-of-way, and joining the old line a short distance south of Hudson street. The total length of this relocation is 9,630 ft.

The location adjacent to the Big Four involves crossings of only two streets, Eleventh avenue and Seventeenth avenue, over which the Big Four tracks are carried on steel bridges. But the property abutting on the east side of the Big Four right-of-way between these two streets comprises a part of the Ohio State Fair Grounds and the State Fair commissioners were not only reluctant to dispose of any of their property, but also insisted on maintaining the frontage on the Big Four

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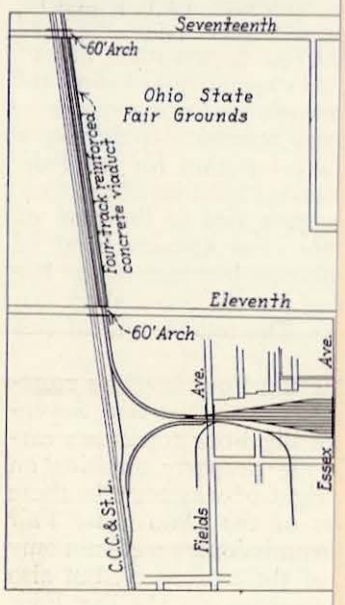


The Fairgr

A 60-Ft. Arch Spans Eleventh Avenue at the South End of the Viaduct

for rodding the concrete in the column forms was avoided by the use of electric vibrators that were clamped to the forms while the concrete was being placed.

All of the concrete was proportioned in accordance with the water-cement ratio for a desired strength of 3000 lb. per sq. in. at 28 days. Tests of specimen cylinders indicated a strength well above that value, while core specimens cut from one of the columns gave values ranging from 4,000 to 4,700 lb. per sq. in. at an age of about 3 months. Surface treatment of the concrete was limited to rubbing facia columns and drop panels with abrasive bricks accompanied by a cement wash, except that certain panels in the spandrels and parapets of the two street arches were bush hammered.

The extension of the Grogan yard increased its capacity from 1010 cars to 2324 cars. This increase in capacity was effected by moving the ladder tracks to the west a sufficient distance to provide 22 tracks with a maximum capacity of 118 cars, whereas the original maximum capacity per track was 63 cars. The improvements to the Grogan yard also involved grade separation, subways being provided at Fields, Essex and Cleveland avenues. The Fields avenue subway under the west throat of the yard carries 4 tracks while the other two subways each pass under 22 tracks. These are three-span structures supported on concrete abutments and reinforced concrete bents at the curb lines, the sidewalk spans consisting of reinforced concrete slabs and the long spans between the curb lines involving the use of 30-in. wide-flange I-beams incased in concrete.

Other Improvements Involved

Simultaneous with the enlargement of the Grogan yard and the construction of the viaducts, extensive improvements were made east of the Cleveland line crossing. The Norfolk & Western extended its yard to the east (or south) and the Pennsylvania built a new ten-track yard north of and parallel to the Norfolk & Western yard. A portion of the lake coal handled in interchange between the Norfolk & Western and the Pennsylvania at Columbus, moves in solid trains without breakup at Columbus, and the new 10-track yard was provided for the delivery of these trains to the Pennsylvania and the changing of engines and cabooses and crews.

The project was planned and executed by the construction department of the Pennsylvania, Western region, under the direction of I. W. Geer, chief engineer and E. E. Stetson, assistant to the chief engineer. The structures were designed under the supervision of E. Weidemann, engineer of bridges and buildings, Western region. The John F. Casey Company, Pittsburgh, Pa., was the contractor for the Fair Ground viaduct and the two street arches together with the adjacent retaining walls, while the three subways under Grogan yard were built under contract by the Fritz-Rumer-Cook Company of Columbus. The grading and track work was done under a contract with the Ferguson & Edmondson Company, of Pittsburgh, Pa.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended August 29 amounted to 763,764 cars, which, although it represented an increase of 15,053 cars as compared with the week before, was relatively the lowest total reported since the depression began, when compared with the corresponding weeks of the past two years. It was a reduction of 220,746 cars as compared with the corresponding week of last year, which turned out to be the peak week for 1930, and a reduction of 398,336 cars as compared with 1929, in which year the peak occurred in the last week of September. All classes of commodities except grain and grain products and ore showed increases as compared with the preceding week but grain loading showed a reduction of 4,307 cars and was 19,205 cars less than that for last year. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

	Week Ended Saturday, August 29, 1931.		
Districts	1931	1930	1929
Eastern	174,283	218,141	262,570
Allegheny	147,002	197,725	239,620
Pocahontas	49,172	56,571	66,920
Southern	105,059	130,426	153,042
Northwestern	111,564	157,936	184,761
Central Western	117,406	145,533	163,481
Southwestern	59,278	78,178	91,706
Total West. Dists.	288,248	381,647	439,948
Total All Roads	763,764	984,510	1,162,100
Commodities			
Grain and Grain Products	40,453	59,658	53,496
Live Stock	24,248	24,554	26,828
Coal	134,403	168,879	189,700
Coke	4,868	8,483	11,859
Forest Products	28,036	42,824	69,823
Ore	34,927	55,748	75,237
Mdse. L.C.L.	214,627	239,322	266,743
Miscellaneous	282,202	385,042	468,414
August 29	763,764	984,510	1,162,100
August 22	748,711	940,558	1,137,966
August 15	742,736	922,823	1,102,567
August 8	734,780	904,157	1,092,153
August 1	757,293	919,781	1,105,920
Cumulative totals, 35 weeks	25,658,035	31,428,015	35,377,737

The freight car surplus for the week ended August 22 averaged 573,252 cars, a decrease of 1,132 cars as compared with the week before. The total included 296,622 box cars, 211,767 coal cars, 25,376 stock cars and 15,064 refrigerator cars.

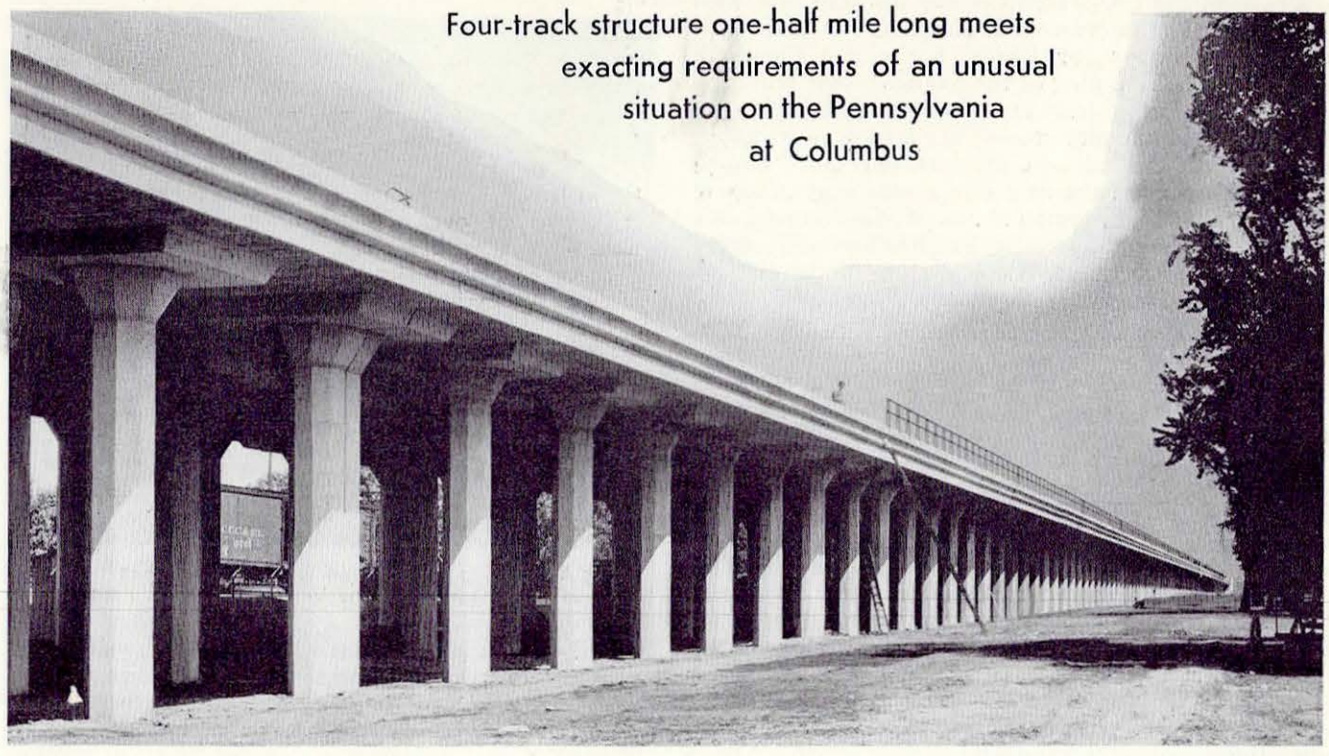
Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended August 29 totaled 49,011 cars, an increase over the previous week of 1,518 cars, but a decrease from the same weeks last year of 23,430 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
August 29, 1931	49,011	22,562
August 22, 1931	47,493	21,599
August 15, 1931	47,556	21,544
August 30, 1930	72,441	31,797
Cumulative Totals for Canada		
August 29, 1931	1,678,784	919,666
August 30, 1930	2,085,020	1,182,899
August 31, 1929	2,337,638	1,450,472

Flat Slab Viaduct Solves Right-of-Way Problem

Four-track structure one-half mile long meets exacting requirements of an unusual situation on the Pennsylvania at Columbus



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The location adjacent to the Big Four involves crossings of only two streets, Eleventh avenue and Seventeenth avenue, over which the Big Four tracks are carried on steel bridges. But the property abutting on the east side of the Big Four right-of-way between these two streets comprises a part of the Ohio State Fair Grounds and the State Fair commissioners were not only reluctant to dispose of any of their property, but also insisted on maintaining the frontage on the Big Four

right-of-way. Studies designed to meet these objections led to a plan whereby the Pennsylania acquired an easement on a strip of the fair grounds adjacent to the Big Four for the construction of a viaduct of sufficient width for four tracks, under the terms of which the State Fair authorities retained the use of the ground under the viaduct.

This new line embodies a complete separation of grades with the city streets, as was also the case with the extension of Grogan yard, the plans for which provided for subways for Fields, Essex and Cleveland avenues. The rerouting of the Sandusky line thus provided a new line entirely free from grade crossings to replace the old line that crossed five streets at grade. As a consequence the City of Columbus contributed toward the construction of the new line a sum approximating 35 per cent of the estimated cost of eliminating grade crossings on the old line between Cleveland and Seventeenth avenues inclusive, which portion of the old line was abandoned by the Pennsylvania.

Advantages of Flat-Slab Design

The selection of the type of structure best suited to the requirements of the fair-ground location embraced an interesting study. While the primary reason for the demand for a bridge structure was to afford access to the Big Four tracks for the loading and unloading of exhibits, principally livestock, the dimensions of the new viaduct, 2,462 ft. long by 60 ft. wide, suggested the use of the ground area it covers for stock pens and other purposes. The selection of the design was influenced by the relative adaptability of various types of structures to such use, and a reinforced concrete flat-slab viaduct proved far more attractive from this standpoint than a structure of the bent-and-span type in either steel or reinforced concrete. It proved also to be decidedly more attractive from a cost standpoint.

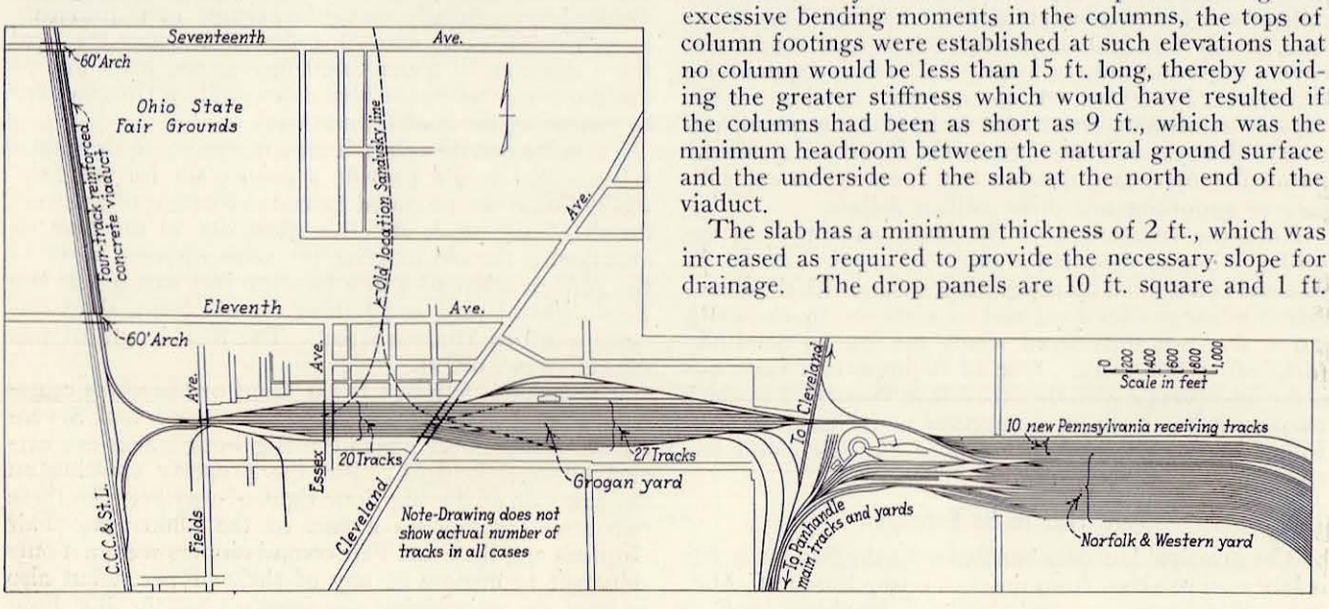
The column spacing decided on is 21 ft. center to center (three rows) transversely and 21 ft. 2¾ in. longitudinally. The design of this structure comprised an adaptation of the general method employed in flat-slab concrete building construction, with such modifications as were necessary to meet the special conditions imposed by railroading loading. The criterion for live loading used in the design was a uniform-load equivalent to the driver-axle concentrations of the standard locomotive loading of the Pennsylvania, assumed as distributed uniformly over a longitudinal strip 14 ft. wide (the track spacing on the structure). For positive moment the load was assumed as applied to one panel only, while for negative moment and for column loads the same uniform load was assumed as covering two panels, which implies a greater number of axle concentrations than the five embodied in the Pennsylvania standard locomotive live load. For the type of structure involved, the additional cost imposed by such loading is inconsiderable and it was felt that advantage should be taken of this condition to provide for a possible future increase in length of driver base and weight of engines.

Fencing Attached to the Bands on the Columns Makes it Possible to Use Space Under the Viaduct for Stock Pens

Expansion Joints

For the proportioning of the columns, the design was tested as a stiff frame and adequate allowance was made for bending moment carried into the columns. To guard against the possibility of excessive bending in the columns by reason of temperature changes, the viaduct was divided into longitudinal units 127 ft. 4½ in. long (six panels) separated by 2-in. expansion joints. Double columns supported on a common foundation were provided at these joints. As a further precaution against excessive bending moments in the columns, the tops of column footings were established at such elevations that no column would be less than 15 ft. long, thereby avoiding the greater stiffness which would have resulted if the columns had been as short as 9 ft., which was the minimum headroom between the natural ground surface and the underside of the slab at the north end of the viaduct.

The slab has a minimum thickness of 2 ft., which was increased as required to provide the necessary slope for drainage. The drop panels are 10 ft. square and 1 ft.



The Fairground Viaduct in its Relation to Grogan Yard and Other Terminal Facilities

thick. The intermediate columns are octagonal—2 ft. 10 in. on the short diameter, while the double columns at the expansion joints, which together form an elongated octagon, have a short diameter of 2 ft. 6 in. The deck is covered with a membrane waterproofing carried over the expansion joints on lead flashing and conforming to the slope of the surface so as to carry the water to two drain outlets in each 127-ft. unit of the viaduct. The unique feature of this drainage plan is that the water is discharged through 4 in. cast iron down-spouts that are carried down inside the columns and then out on an incline to catch basins alongside the column footings.

The viaduct terminates at each end in a handsome three-centered arch of 60 ft. span over the full width of Eleventh avenue and Seventeenth avenue, respectively. Arches were practicable at these two locations owing to the fact that these streets had previously been depressed a sufficient amount to permit of subways under the Big Four tracks. Consequently, the higher elevation of the Pennsylvania tracks afforded ample headroom for arch structures.

Foundations

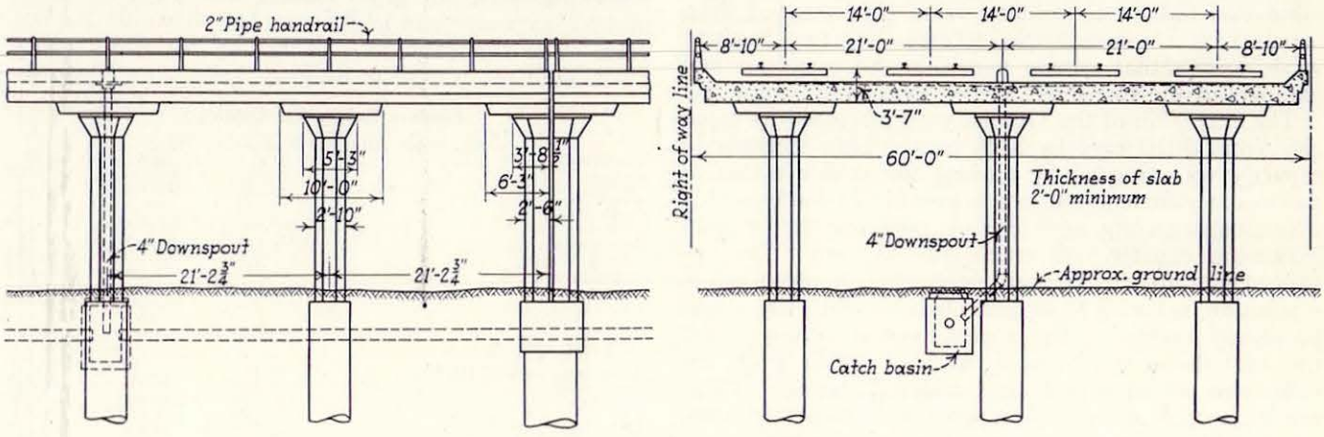
An interesting study was imposed in the foundation design because of the imperative necessity for insurance against settlement in a structure of the type adopted. The soil at the surface and extending down to a depth of

The Subway at Essex Avenue Passes Under 22 Tracks

feet in diameter and belled out at the bottom to reduce the bearing pressure to four tons per square foot. The excavation was done by hand, using tripod supported niggerhead winches operated in groups for hoisting the muck buckets.

Concreting Methods

The concrete was mixed at a stationary plant located adjacent to the Pennsylvania tracks a short distance south of Eleventh avenue, and was transported to the point of placing along the viaduct in dump buckets delivered on narrow-gage cars hauled by a gasoline locomotive. This narrow-gage track was carried over Eleventh avenue on a temporary trestle and run along

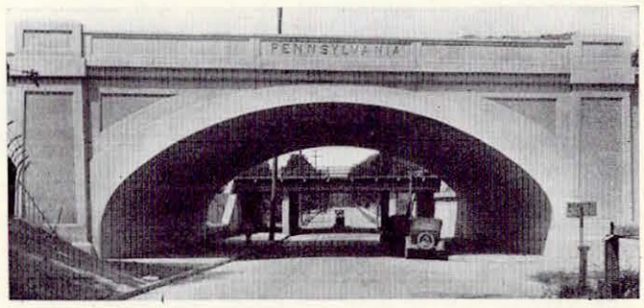


Part Elevation and a Cross-Section of the Viaduct

12 to 20 ft. is yellow clay, while under this material there is a considerable depth of hard blue clay or hard pan. The yellow clay, which is fairly stiff at a depth of 10 to 12 ft. is of a character able to support a load of 1½ to 2 tons per square foot, but to obtain this bearing pressure involved a rather large footing area. To meet these conditions a design was developed which embodied a grid of longitudinal and transverse reinforced concrete footing beams, but because this plan entailed the complication of heavy excavation over a large part of the area covered by the structure, this scheme was abandoned in favor of open-caisson or well-type foundations extending to a depth of 25 ft.

This plan entailed far less excavation, disturbed a much smaller area and had the advantage of insuring against the need of underpinning in the event that subsequent building operations adjacent to the site of the viaduct should result in deep excavation. It was felt also that the hard blue clay would develop adequate lateral resistance on the caisson walls to take care of bending moments in the columns. As a matter of fact the soil conditions were especially favorable for this type of foundation as the excavation could be completed without resort to sheeting. The wells were made four

the east side of the viaduct parallel with a standard-gage track which was occupied by a locomotive crane that was employed to lift the buckets to the point of dumping over the caissons, the tops of the columns and the slab. In the placing of the slab concrete, transportation by the crane was supplemented by a belt conveyor to deliver the concrete to the more remote portions. The forms for the slab were supported on a traveling frame which was rolled forward on a multiple-rail track and wedged up in its successive positions. The need



Arch Over Seventeenth Avenue and Big Four Structure in the Background

A 60-Ft. Arch Spans Eleventh Avenue at the South End of the Viaduct

for rodding the concrete in the column forms was avoided by the use of electric vibrators that were clamped to the forms while the concrete was being placed.

All of the concrete was proportioned in accordance with the water-cement ratio for a desired strength of 3000 lb. per sq. in. at 28 days. Tests of specimen cylinders indicated a strength well above that value, while core specimens cut from one of the columns gave values ranging from 4,000 to 4,700 lb. per sq. in. at an age of about 3 months. Surface treatment of the concrete was limited to rubbing facia columns and drop panels with abrasive bricks accompanied by a cement wash, except that certain panels in the spandrels and parapets of the two street arches were bush hammered.

The extension of the Grogan yard increased its capacity from 1010 cars to 2324 cars. This increase in capacity was effected by moving the ladder tracks to the west a sufficient distance to provide 22 tracks with a maximum capacity of 118 cars, whereas the original maximum capacity per track was 63 cars. The improvements to the Grogan yard also involved grade separation, subways being provided at Fields, Essex and Cleveland avenues. The Fields avenue subway under the west throat of the yard carries 4 tracks while the other two subways each pass under 22 tracks. These are three-span structures supported on concrete abutments and reinforced concrete bents at the curb lines, the sidewalk spans consisting of reinforced concrete slabs and the long spans between the curb lines involving the use of 30-in. wide-flange I-beams incased in concrete.

Other Improvements Involved

Simultaneous with the enlargement of the Grogan yard and the construction of the viaducts, extensive improvements were made east of the Cleveland line crossing. The Norfolk & Western extended its yard to the east (or south) and the Pennsylvania built a new ten-track yard north of and parallel to the Norfolk & Western yard. A portion of the lake coal handled in interchange between the Norfolk & Western and the Pennsylvania at Columbus, moves in solid trains without breakup at Columbus, and the new 10-track yard was provided for the delivery of these trains to the Pennsylvania and the changing of engines and cabooses and crews.

The project was planned and executed by the construction department of the Pennsylvania, Western region, under the direction of I. W. Geer, chief engineer and E. E. Stetson, assistant to the chief engineer. The structures were designed under the supervision of E. Weidemann, engineer of bridges and buildings, Western region. The John F. Casey Company, Pittsburgh, Pa., was the contractor for the Fair Ground viaduct and the two street arches together with the adjacent retaining walls, while the three subways under Grogan yard were built under contract by the Fritz-Rumer-Cook Company of Columbus. The grading and track work was done under a contract with the Ferguson & Edmondson Company, of Pittsburgh, Pa.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended August 29 amounted to 763,764 cars, which, although it represented an increase of 15,053 cars as compared with the week before, was relatively the lowest total reported since the depression began, when compared with the corresponding weeks of the past two years. It was a reduction of 220,746 cars as compared with the corresponding week of last year, which turned out to be the peak week for 1930, and a reduction of 398,336 cars as compared with 1929, in which year the peak occurred in the last week of September. All classes of commodities except grain and grain products and ore showed increases as compared with the preceding week but grain loading showed a reduction of 4,307 cars and was 19,205 cars less than that for last year. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

Week Ended Saturday, August 29, 1931. Districts	1931	1930	1929
Eastern	174,283	218,141	262,570
Allegheny	147,002	197,725	239,620
Pocahontas	49,172	56,571	66,920
Southern	105,059	130,426	153,042
Northwestern	111,564	157,936	184,761
Central Western	117,406	145,533	163,481
Southwestern	59,278	78,178	91,706
Total West. Dists.	288,248	381,647	439,948
Total All Roads	763,764	984,510	1,162,100
Commodities			
Grain and Grain Products	40,453	59,658	53,496
Live Stock	24,248	24,554	26,828
Coal	134,403	168,879	189,700
Coke	4,868	8,483	11,859
Forest Products	28,036	42,824	69,823
Ore	34,927	55,748	75,237
Mdse. L.C.L.	214,627	239,322	266,743
Miscellaneous	282,202	385,042	468,414
August 29	763,764	984,510	1,162,100
August 22	748,711	940,558	1,137,966
August 15	742,736	922,823	1,102,567
August 8	734,780	904,157	1,092,153
August 1	757,293	919,781	1,105,920
Cumulative totals, 35 weeks	25,658,035	31,428,015	35,377,737

The freight car surplus for the week ended August 22 averaged 573,252 cars, a decrease of 1,132 cars as compared with the week before. The total included 296,622 box cars, 211,767 coal cars, 25,376 stock cars and 15,064 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended August 29 totaled 49,011 cars, an increase over the previous week of 1,518 cars, but a decrease from the same weeks last year of 23,430 cars.

	Total Cars Loaded	Total Cars Rec'd from Connections
Total for Canada		
August 29, 1931	49,011	22,562
August 22, 1931	47,493	21,599
August 15, 1931	47,556	21,544
August 30, 1930	72,441	31,797
Cumulative Totals for Canada		
August 29, 1931	1,678,784	919,666
August 30, 1930	2,085,020	1,182,899
August 31, 1929	2,337,638	1,450,472

Carriers' Rebuttal Ends Rate Hearings

Over 100 witnesses representing all branches of industry testify at six-day session at Chicago

MORE than 100 witnesses testified at the six-day hearing on the application of the railroads for an increase of 15 per cent in freight rates, which was held at Chicago from August 31 to September 5, and which was concluded by the carriers' rebuttal testimony on the afternoon of the latter day. During the six-day hearings at Chicago, the commission held two sessions concurrently, while on September 2 a third session was added, and on September 4 the number was increased to four, which ran from 9:30 a.m. until 11 p.m. on September 5 and from 9:30 a.m. to 1:30 p.m. on Saturday, September 5. On Saturday afternoon the sessions were consolidated and rebuttal testimony of the carriers was presented. Commissioner E. I. Lewis was in charge of hearing A, Commissioner Claude R. Porter in charge of hearing B, Commissioner B. H. Meyer in charge of hearing C, and Commissioner William E. Lee in charge of hearing D. During the carriers' rebuttal, Commissioner Meyer presided.

In rebuttal to the charges made frequently during the hearing that the carriers could combine certain passenger trains and effect other economies in passenger train operation, C. A. Fox, chairman of the Central Passenger Association, testified that in the case of many trains the preponderance of the traffic is between intermediate points enroute, or between intermediate points on the one hand and the termini on the other. He contended that while the New York and Chicago figures show that there are 45 westbound daily services from New York to Chicago, some of these are performed by a single train of one given carrier, thus resulting in three separate and distinct New York-Chicago services. He said that a train or a combination of trains from New York to Chicago, for example, may carry cars originating at or destined to such divergent points as Boston, Mass., Detroit, Mich., Mackinac City, Louisville, Ky., and Atlantic City, N. J. Another appreciable factor, he said, is the head-end traffic, that is mail and express, which, in some instances, would not be sufficient in itself to justify the operation of trains if no passengers were carried thereon.

T. Thompson, chairman of the Western Passenger Association, testified regarding passenger train service between Chicago and the Twin Cities, between Chicago and St. Louis, between Chicago and Kansas City, between Chicago and Omaha, and between St. Louis and Kansas City. He said that since January 1, 1930, the carriers had eliminated 4,527,058 passenger train miles in the western territory. This included 1,333,163 miles between Chicago and the Twin Cities, 1,389,335 miles between Chicago and Omaha, 858,115 miles between Chicago and St. Louis, 817,600 miles between Chicago and Kansas City, and 128,845 miles between St. Louis and Kansas City. He asserted that the new trains added, in many instances, did not increase the number of passenger train miles.

He contended that some trains cannot be consolidated because of the long-haul traffic, which at present, is the important factor in passenger train operation, and that, following studies made by the carriers, the present method of operation was found to be the best. In discussing passenger train service between Chicago and St. Louis, he cited the Chicago & Alton, which operates 47.7 per cent of the passenger train mileage and which secures 80.3 per cent of the revenue. At this point, Clyde M. Reed, former governor of Kansas asked the commission to direct the carriers to furnish a statement showing the earnings per train for as many trains as possible. The commissioners considered the request and Commissioner Meyer stated that the matter would be taken up with Commissioner C. D. Mahaffie, who is now conducting a study of passenger train service with a view to eliminating unnecessary service, to determine whether such a procedure would be in keeping with the latter's plan.

Wholesale Diversion of Traffic to Trucks Impossible

Dr. Julius H. Parmalee, director of the Bureau of Railway Economics, presented figures to indicate that a wholesale diversion of rail traffic to trucks, because of the 15 per cent increase, as charged by previous witnesses, is a physical and financial impossibility. "If freight rates should be advanced 15 per cent as proposed," he said, "at least 13 per cent of the revenues derived from the new rates would have to be diverted to offset the benefit of the increase. Truck competition would doubtless be found active on the shorter haul and higher-rated commodities, although to take away 13 per cent of the rail freight revenue the truck would also find it necessary to handle many commodities now carried by rail at the lower levels of rates. Let it be conceded that the average revenue per ton-mile on the classes of traffic that would be diverted from rail to highway would be twice as great as the average revenue per ton-mile received by the railways on all their freight traffic. On this basis, the trucks would have to make inroads to the extent of approximately seven per cent of the total rail ton-mileage in order to offset an increase of 15 per cent in revenue. Seven per cent of the 383 billion ton-miles carried by rail carriers of Class I in 1930, would be 27 billion ton-miles. To get this traffic, motor trucks would be forced to add this aggregate of freight movement to their haulage of interurban freight under present conditions."

By utilizing certain average bases, he then estimated that 400,000 additional trucks would be necessary to handle this traffic, while the amount invested in these trucks would total $1,200,000,000. The wages for drivers would amount to not less than $400,000,000 per year. In contrast, he pointed out that Class I railways had on their payrolls in 1930, a total of 125,000 men assigned to road freight service as enginemen, firemen, conductors, brakemen and flagmen. These 125,000 men were the operators of freight trains that handled all of the freight traffic of the railways. To handle 7 per cent of that same traffic by truck would call for the labor of 400,000 drivers. The loading of the average freight train in 1930 was 785 tons and to handle such a train required an engine and train crew of 5 or 6 men. The same tonnage transported by motor truck, using an average loading of 5 tons per truck, he said.

would require the employment of 157 trucks with 157 drivers.

During the presentation of this evidence, Commissioner Meyer interjected the thought that the question involved at the present time is not how much the truck can take away from the carriers but rather what the railroads can do to hold their present traffic. He instructed interested parties to bear this in mind when presenting final arguments at Washington. Upon cross-examination by R. C. Fullbright, counsel for the National Industrial Traffic League, Mr. Parmelee stated that the 9,000,000,000 ton miles handled by the Inland Waterways would have to be doubled or tripled, because of the nature of the traffic handled, before much inroad would be made upon the railroads' traffic.

Increase Would Not Discourage Production

Dr. David Friday, economist, testified for the carriers to show that an increase would not discourage production in any major branch of American industry. "During the last seven months," said Dr. Friday, "since production reached its low in December, the output of minerals and manufactures has been running at an average of 86 according to the index of production of the Federal Reserve Board. This is based upon the years, 1923 to 1925, as 100. Agriculture is at a level of about 110, when based upon the same years. Total building contracts awarded have been at 72. It is my opinion that production will not be decreased in any of these lines of industry if freight rates are increased, and it is also my opinion that the revival of production will not be hampered when business revival comes."

Dr. Friday added that past experience furnishes no basis for believing that an increase of 15 per cent in freight rates will restrict production, but rather supports the opposite conclusion that by improving the credit of the railroads and enabling them to buy equipment and make other improvements, it did much to start the revival of 1922 and 1923. Industry can bear this increase in rates because the service rendered by the railroads is worth many times what it costs, he said. There are $700,000,000 of hoarded currency and billions of bank deposits which should be invested in long term securities, he continued. This will stimulate both production and prices so that men and machines will be put to work producing wealth. If 300,000, or 5 per cent, of the unemployed can be put to work, they will produce, at a conservative estimate, $600,000,000 of wealth. This will more than cover the cost of the increase in rates.

Compensation Increased 157 Per Cent

E. E. Williamson, commerce and transportation specialist of James Williamson & Scott, New York, who appeared on behalf of various industries, presented figures to show that in 1929, as compared with 1910 as a basis of 100, operating revenues were 226.6 per cent of those in the earlier year, freight revenues 254.4 per cent, passenger revenues 139.3 per cent, operating expenses 243.3 per cent, the number of employees 99.7 per cent, compensation 257.1 per cent, operating expenses less compensation 222 per cent, taxes 410.8 per cent and net railway operating income 156.8 per cent. As rebuttal to an exhibit presented by Fairman R. Dick for the Security Holders' Committee on the Railroad Emergency, which showed that the "net earnings" of the railroads had decreased from 30 per cent for the years, 1890 to 1910, to 12.1 per cent for 1931, while expenses, including taxes and rentals, has increased from 70 per cent during the first period to 87.9 per cent in 1931, Mr. Williamson analyzed the expenses for the period from 1921 to 1929, in comparison with the period from 1895 to 1910. While the net railway operating income during the more recent period had decreased 13.4 per cent in comparison with the earlier period, over half of this amount, he contended, was due to the fact that compensation had increased 7.1 per cent. Operating expenses, less compensation, or material, supplies and equipment, increased 2.1 per cent, railway tax accruals 2.7 per cent and hire of equipment and joint facility rent 1.5 per cent.

Mr. Williamson contended that the present depression is more extensive, more severe and of longer duration than the depression of 1921, and that although at that time it was contended by shippers that the freight rate level of 1921 was too high, the carriers now propose increases which, if granted, will place the present general level of freight rates above the 1921 level. He concluded his testimony by saying that the railroads should find means of reducing passenger expenses and recommended the pooling of trains.

Agriculture Well Represented

More evidence was presented to show that agriculture could not endure higher rates than was presented in behalf of any other single industry. This testimony defending agriculture was presented by Senator Brookhart, representatives of state commissions, representatives of agriculture and others, but the most pertinent facts relating to the agricultural situation in 1931 were presented by L. H. Bean, senior agricultural economist of the Division of Statistical and Historical Research of the United States Department of Agriculture, at the request of the commission. Mr. Bean testified that estimates for 1930 indicate a gross income from farm products of about $9,347,000,000, compared with $11,911,000,000 in 1929, or a decline of 22 per cent. This, he said, is the lowest estimate of gross income since 1921, when it amounted to $8,717,000,000 and compares with the largest total in recent years, obtained in 1925, amounting to $11,968,000,000. This decline, he stated, was accompanied by only a moderate decrease in expenses of production, most of the costs remaining practically unchanged, except feed, farm wages and machinery. Thus the decline in gross income reduced the amount of income available for capital, labor and management by about 33 per cent, or from $5,579,000,000 in 1929 to $3,750,000,000 in 1930. This amount, he continued, falls short by about $346,000,000 of a wage allowance for the farm operators' labor, even at reduced farm wage rates, and leaves no income available for capital or management, which in 1929 amounted to $1,060,000,000. He explained that a study of 6,000 farms, which averaged approximately 300 acres per farm, showed that the income available for operators' capital, unpaid labor and management amounted to $598 per farm in 1930, as compared with $862 in 1924, and that if each farm was allowed 4.5 per cent interest on the operators' net capital investment, the reward for labor and management per farm family, which contributed labor equivalent to that of 1.2 men, amounted to $425 in 1930, as compared with $668 in 1924. Of this $425, the average paid for food not raised on the farm was $250. The remaining $175 went for clothing, recreation and education.

D. L. Kelley, rate expert of the South Dakota Board of Railroad Commissioners, besides recommending the curtailment of passenger train service, suggested the

use of joint facilities as additional economies which could be effected by the railroads in South Dakota. He said that either of the branch lines of the Chicago & North Western and the Great Northern, which parallel each other between Bolin and Yankton, a distance of 12 mi., could be operated jointly and the other line abandoned, which would not only eliminate the maintenance expenses in connection with the track, but would also eliminate the maintenance of duplicate stations and of separate agencies at the Bolin and Mission Hill. Five railroads, namely, the Chicago, Minneapolis & Omaha, the Illinois Central, the Great Northern, the Chicago, Rock Island & Pacific and the Chicago, Milwaukee, St. Paul & Pacific enter Sioux Falls and each of these roads maintains a separate passenger station. Since the Omaha's station is large enough to accommodate the entire passenger business in this city, it could be made to serve all of the railroads at a very small expense. At Huron, S. D., he testified, the North Western has a large modern brick station, appraised by the Interstate Commerce Commission at $71,100, which is sufficient to take care of the passenger needs of both roads, as it did during Federal control, while at the same time, the passenger station occupied by the Great Northern, which occupies one of the most valuable industrial sites in the city, would furnish substantial revenues through leasing. As an example of unnecessary expenditures, he cited the construction of passenger facilities at Omaha, Neb.

Brookhart Recommends 3 Per Cent for Capital Return Instead of 5¾ Per Cent

Senator Brookhart took the stand and recommended that because of the present economic condition of the country, the capital return for the railroads, which Congress has set at 5¾ per cent as fair, be readjusted to 3 per cent in order to treat other industries fairly. He estimated the national income in 1930 at $90,000,000,000 and said that if it had been distributed proportionately there would have been no unemployment. He contended that the war did not cause the depression and blamed freight rates. He also charged waste and profiteering as causes for the present condition of the country, estimating the waste of competition between industries at six or seven billion dollars and that among the railroads at four hundred million dollars.

I. C. Peterson, assistant rate expert and statistician of the Kansas Public Service Commission, representing the Committee of Western State Commissions offered an exhibit designed to present a survey of the progress of the carriers over the last 20 years "in order that the present may be interpreted in the light of the past." He contended that with the increase of mileage operated, there should have resulted a substantial reduction in the unit cost of operation, basic costs remaining the same, and that the railroads, being subject to the economic law of increasing returns, should show a reduction in costs with each increase in traffic, at least up to the point of complete utilization of the plant. He claimed that the decline in revenue per ton mile since 1921, aside from the rate reductions in 1922, is a result not so much of the whittling away of the rate structure as of the change in the character of the tonnage. He based this statement on figures which showed that of a total increase of 153,654,286 tons, products of mines accounted for 94,326,774 or 61.4 per cent, yielding a low ton-mile revenue because of the heavy loading. His exhibit also showed that since 1921, the revenue per train mile has increased from $7.09 to $7.41, and that expenses on the other hand declined from $5.50 to $4.73, so that the net revenue per train mile has increased from $1.59 to $2.68, or 68 per cent. He said that the carriers have been permitted to retain at least the greater bulk of the savings resulting from these operating economies, which were made possible, at least in part, by the greater increase in the tonnage offered by the public, and that only a relatively small portion of the savings has been passed on to the public.

By way of summing up his exhibit, he contended that it appeared that the commission has dealt generously with the carriers since the war, that it has permitted them to keep the greater bulk of the savings resulting from operating economies, thereby more than compensating the roads for the heavy losses sustained from their passenger operations, and that the period discussed has necessarily been one of readjustment, resulting from a partial obsolesence of the carriers' plants, due to the changed modes of transportation.

Waterways

He also compared the relative decline in railway and waterway traffic. Thus, he said, while the tons of revenue freight handled by the steam railroads of the country during the first five months of 1931 amounted to 72.81 per cent of the tonnage handled during the same months of 1929, the tonnage handled by all inland waterways during the first five months of 1931 amounted to 47.71 per cent of the amount handled during the first five months of 1929. The so-called subsidized Mississippi River government barge line competition, he declared, has been frequently referred to as being one of the reasons for the railroads' loss of traffic, but according to an exhibit submitted, the tonnage carried on Mississippi river government barges during the first five months of 1931, amounted to only 65.83 per cent of the tonnage handled in 1929. In other words, the decline in traffic handled by these barges has been more pronounced than the decline on the steam railways. Waterway competition, he said, has been no more severe during the depression than it was before and the traffic on the waterways, as a whole, has suffered along with that of the steam railways. He contended that the current depression has resulted in a reduction in business activity in practically all lines and that it naturally follows that the demand for goods being less, the railroads have less to carry. The fairly close correspondence between the lessened rate of industrial activity and production and the decline in the carriers' tonnage shows clearly that the present condition of the carriers is due to the loss of tonnage from this cause. The carriers' condition, he continued, may reasonably be expected to improve with a revival in business and the accompanying increased demand for goods.

In order to show further the relationship that exists between the railroads and other forms of business activity, he compared the net income of 112 industrial corporations in 1930 with that in 1929. In 1930, the net income of these industries amounted to 59.6 per cent of the income in 1929 as compared with 58.60 per cent for the railroads, dividends declared by the industries amounted to 93.6 per cent of those declared in 1929 as compared with 104.42 per cent for the railroads and the excess of income over dividends for the industries amounted to 2 per cent in contrast to 5.22 per cent for the railroads.

T. Z. Buckwalter, a representative of the Timken Roller Bearing Company, spoke in favor of the increase.

(*Continued on page 400*)

Air Conditioning With Water As a Refrigerant

Steam from the train line supplies most of the power required—Electric motors are used for fans and circulating pumps

AN air conditioning system for railroad passenger cars which employs nothing but water and steam as a means of refrigeration has been developed by the Carrier Engineering Corporation, Newark, N. J., and will be made available to the railroads through the co-ordinated efforts of this company, the Safety Car Lighting & Heating Company, New Haven, Conn., and the Vapor Car Heating Company, Inc., Chicago.

No compressor having moving parts is employed, nor is any refrigerant other than water used and thus no additional hazards to passengers are involved in the use of the apparatus. The principle of refrigeration is similar to the principle used in a locomotive water injector. The car is cooled by circulating the air in the car together with fresh air from the outside over cooling coils filled with cold water. As the air is cooled, a part of the moisture in the air is deposited on the coils and allowed to drain off, thus reducing the humidity.

Temperature Control

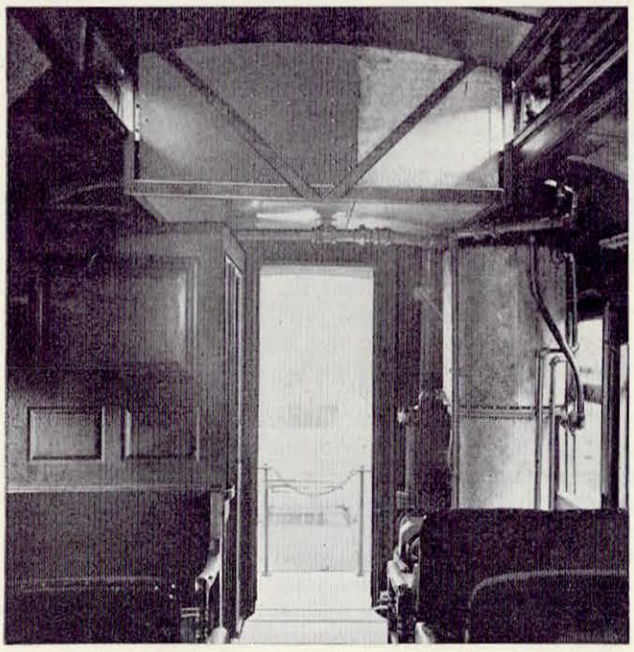
The temperature is controlled by automatically operated dampers which allow the air to by pass or entirely pass over the cooling coils according to the temperature requirements in the car.

Positive means for introducing ample quantities of outside air at all times have been provided for ventilation and health, as well as to prevent objectionable odors. This outside air is filtered to remove dust, dirt, cinders, etc., by filters located in the side decks. During periods of low outside temperature the entering air is pre-heated to a desired temperature.

The water which circulates through the cooling coils is cooled by spraying it into a tank in which a vacuum is maintained by a steam ejector. This part of the apparatus is known as the evaporator, for the cooling effect is obtained by the evaporation of a part of the water in the sprays. This water vapor is carried off with the steam of the ejector to a condensing cooling tower where by means of sprays and the rapid circulation of outside air, the heat of the ejector steam and the heat taken from the cooling water is removed. Water for the cooling tower is taken from and returned to a tank called the make-up water tank. Steam for the ejector is taken from the steam train lines and power for operation of circulating pumps and blowers from the 32-volt axle system.

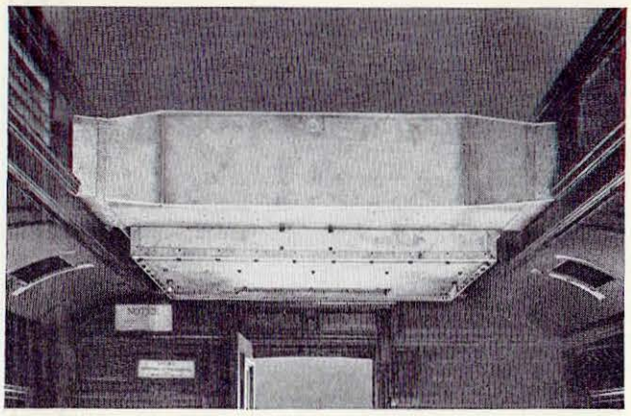
Location of Apparatus

The air conditioning apparatus may be placed in a variety of locations to suit the design of the car. In the demonstration car the air conditioner which includes the air cooling and heating coils is located in the clerestory at one end of the car. The cooling tower is similarly located at the opposite end. The evaporator and make-up water tank are located in a locker at one end of the car. The air conditioning unit is about 5 feet square by 20 inches deep. The dimensions of the cooling tower are approximately 5 ft. by 4 ft. by 2 ft.

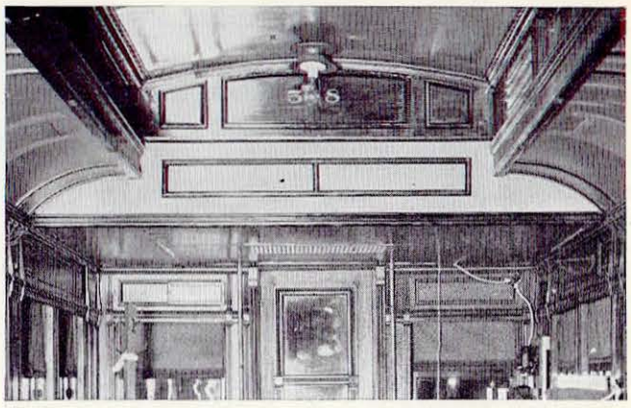


Interior of Demonstration Car Showing Condensing Cooling Tower Above and Evaporator Tank at the Right

The Same End of the Car Shown in the Picture at the Left But With the Equipment Housed



The Air Conditioner Unit in Place



The Air Conditioner with Housing Applied

The evaporator with the make-up tank above are about 7 ft. high and require a floor space approximately 3 ft. square. This portion of the equipment may be distributed under the car in spaces known to be available. The cooled air from the cooling unit is carried in one or two ducts outside along the roof and enters the car through the regular ventilator openings.

The rated capacity of the apparatus is five tons per day—a heat adsorption sufficient to change five tons of ice at 32 deg. into water at the same temperature. This capacity is sufficient to maintain comfortable conditions in a passenger car under the most extreme weather to be found in the United States.

The maximum steam demand is 170 lb. per hour per car which, with a line loss per car of 35 lb., indicates a requirement of 205 lb. per hour for each car from the locomotive. The power required for heating in the winter time is estimated to be a maximum of 260 lb. per hour per car. The total power consumption is said to be considerably less than that of a mechanical system in which power from the locomotive is used to drive axle generators which in turn supply electrical power to operate a compressor. This total for the system, including electric power for the operation of motors and fans, is approximately 11 boiler horse power.

Electric Energy

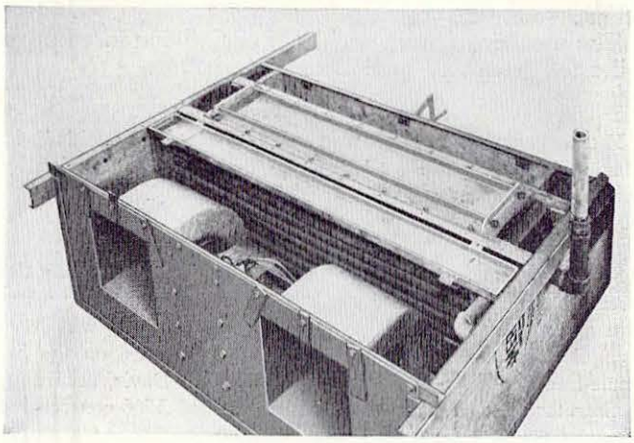
In the demonstration car two ½-hp. and two ¾-hp., a total of 2½-hp. motors were used for the operation of fans and pumps. These drive, respectively, the air circulating fan, the cooling-tower circulating pump, the cold-water pump and the cooling-tower fans. With air conditioning in effect, the regular car fans are not required. These small disc fans usually represent a load of ⅓ kw. and as they will no longer be used, the additional power required for the air conditioning equipment may be reduced by approximately this amount.

The system has a cold water capacity sufficient to maintain cooling in operation while locomotives are changed and batteries of sufficient capacity can easily be applied to operate the motors during short periods while the generators are not delivering power. Steam and electrical connections are required if the cars are to be on a siding or otherwise without a locomotive for any considerable period of time.

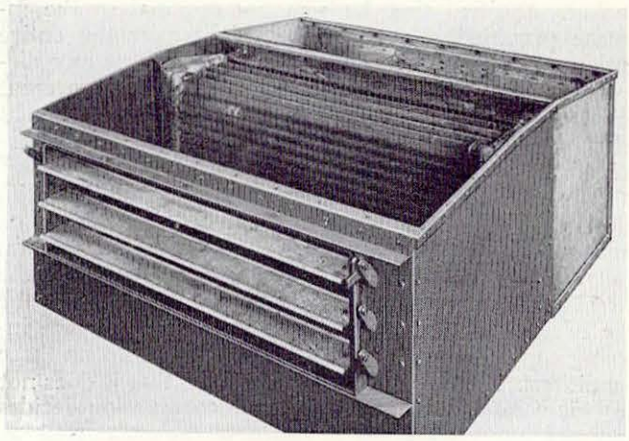
Test Performance

To determine the performance of the unit it was installed in a wooden coach having single windows. The coach was placed in a building in which the outside temperature and humidity could be controlled. Motion of the car was simulated by blowing air alongside the car by means of fans. For purpose of test, the car was filled with passengers and the unit set to operate at a capacity of 5 tons. With an outside dry-bulb temperature of 106 deg. and a wet bulb temperature of 84 deg., the air inside the car was maintained at a temperature of between 75 and 78 deg. This is more extreme than conditions to be found anywhere in the United States as a wet bulb of 84 deg. is not incurred with a dry bulb temperature of 106. Under these conditions, about 45 per cent of the capacity of the unit was required to remove moisture from the air and the remainder to cool the air in the car.

The total weight of the complete system, less ducts, is in the neighborhood of 5,000 lb. Other weight would also be incurred by the additional generator and battery capacity, this weight being subject to a considerable



The Air Conditioner Unit



The Condenser Cooling Unit

variation depending upon the requirements of the run in which the car is used.

Heating System for Winter

The air conditioning unit includes a heating coil so that the system can be used for heating as well as cooling. With this system a majority of the heating apparatus with which present cars are equipped can be eliminated and its weight credited to the new system. In new cars a false ceiling can be used in place of an outside duct system. If desired, a humidifier for adding moisture in the winter time can be added to the heating system.

A group of railway officers and engineers recently witnessed a demonstration of this steam operated air conditioning system at the Carrier plant in Newark, N. J., at which it was also announced that the Silica-Gel Corporation of Baltimore would be associated with the Carrier Corporation and the Safety Car Lighting & Heating Company in the development of air conditioning for railway trains and refrigeration for freight cars.

Carriers' Rebuttal Ends Rate Hearings

(*Continued from page 397*)

expressing the opinion that the increase would arrest the decline in commodity prices.

Representatives of the Indiana Chamber of Commerce and of the Kentucky bituminous coal interests testified that present freight rates were too high and that if there is an increase in railroad rates, business in those sections of the country will go to the truck lines. Isaac Born, attorney for these interests, made a motion that the proceedings be dismissed and that the commission discontinue the hearings. He said that the roads had not been operated in an efficient manner and declared that the carriers should have gone before the "Railroad Labor Board" since 60 per cent of their operating expenses were due to labor costs. The commission took the motion under advisement.

J. S. Brown, traffic manager of the Chicago Board of Trade, asked that switching, terminal and incidental service be exempted from the revision. He suggested that a flat rate on each 100-lb. shipped would be preferred to a percentage increase, the flat rate being uniform throughout a rate territory and perhaps between territories.

O. G. Mayer, president of Oscar Mayer & Co., meat packers, testified that he was not opposed to the increase provided it was spread thinly over the entire nation, and that the railroads were not given any discretion in the matter. He contended that the present relationship of rates should not be disturbed and that when normalcy returns, the increase should be dissolved.

F. W. Ellis, vice-president of Armour & Co., who appeared for that company, Swift & Co., Wilson & Co., and the Cudahy Packing Company, told the commission that the meat packing industry was not opposed to the increase if an increase was necessary to preserve the life of the railroads. He said, however, that the industry's approval of the increase was extended on three conditions. That no industry be exempt, that it does not destroy competition, and that if the commission decides to grant any exemption to business the meat packing industry be included.

Accident Bulletin No. 99

(*Continued from page 390*)

There is no good reason to believe that the roads are not trying to make reports exactly as called for by the rules, but it is believed that strict application of the rules has led to the omission of some classes of accidents formerly included; and the elimination of malingering probably has cut down the number of cases in which injured employees were absent more than three days and therefore reportable. "Safety contests" have undoubtedly led to more care in making reports and in getting men back to work promptly after an injury.

On the whole, the Bureau believes that in comparisons of injuries to employees, year by year, [as published

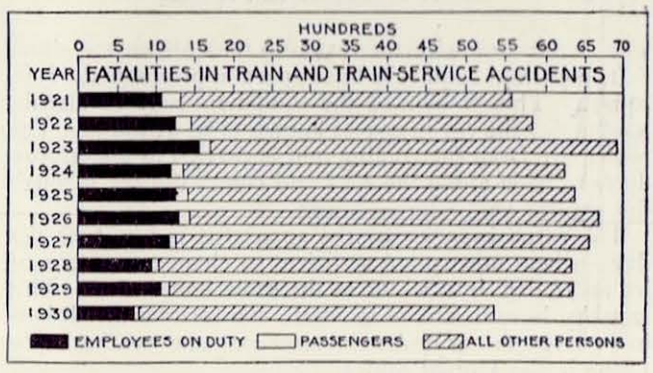


Chart No. 11.—Employees on Duty, Passengers, and Other Persons Killed in Train and Train-Service Accidents, All Steam Railways

in railroad literature] especially non-train injuries, the improvement that has taken place has been considerably exaggerated. This fact, however, "need not prevent the use of the statistics in safety contests."

The number of highway grade crossing casualties per 10,000 automobiles registered, presented in a table covering 14 years, shows a marked reduction, as follows:

1917	8.19
1923	4.75
1929	3.18
1930	2.60

The number of cases where employees reported as injured are reported as subsequently dying, has not changed materially. The ratio of such cases to the total number reported killed has been about 10 or 12 per cent for the last nine years. Incidentally it is to be noted that under the head of passengers injured in train accidents, there is only one reported for 1930 as having subsequently died. This would raise the total killed from 7 to 8.

The number of train accidents per million locomotive miles fell from 9.67 in 1929 to 7.74 in 1930.

HIGHWAYS PARALLEL TO RAILWAYS are to be avoided, in Mexico, if success follows a proposal now under discussion by chambers of commerce. A convention is to be held in Mexico city this month.

SAFETY SUPERINTENDENTS who may be anxious concerning the swelling of their casualty records by employees who, when injured, remain off duty longer than is necessary, will have no fault to find with E. O. Davis, switch foreman on the St. Louis-San Francisco at Springfield, Mo. Mr. Davis, according to Secretary J. L. Walsh, N. S. C., has worked 2,206 consecutive nights, from 11 p.m. until 7 a.m., without the loss of a single shift. This represents more than six years of steady work.

Depreciation Accounting Prescribed by I. C. C.

Revised order effective January 1, 1933, requires straight-line method based on original cost

WASHINGTON, D. C.

REVISED orders prescribing a complete system of depreciation accounting on the straight-line basis for steam railroads and telephone companies, effective January 1, 1933, requiring the railroads to institute such accounting for 43 classes of property, including 35 road items and 8 equipment items, were made public by the Interstate Commerce Commission on September 9, dated July 28. The orders set aside the orders of November 2, 1926, which were issued following an extensive investigation and tentative reports by the commission's depreciation section made public in 1923. The orders were to have become effective on January 1, 1928, but were postponed because of a re-opening of the case at the request of the railroads. The revised orders are accompanied by a voluminous report by Commissioner Joseph B. Eastman as a result of the further hearings, over which he presided, and contain many detail modifications from the original requirements.

Option Allowed as to Accrued Depreciation

One important change is that while the railroads are required to make an estimate, subject to the commission's approval, of the accrued depreciation in their property as of the date of the order, in accordance with the primary investment accounts, they are given the option to credit all or any part of this accrued depreciation which is unprovided for to a depreciation reserve through charges to profit and loss, instead of being required as in the original order, to charge it to a suspense account for clearance later. The railroads had objected to the requirement of the previous order, stating that in many instances the effect of setting up the past accrued depreciation would be to seriously decrease or wipe out the profit and loss surplus, with consequent impairment of credit, but the commission now finds that the estimate should be made for record purposes and use in checking and verifying the depreciation charges.

Definition

The definition of depreciation as given in the original report is modified only in one particular, to read as follows:

"We therefore find that depreciation is the loss in service value not restored by current maintenance and incurred in connection with the consumption or prospective retirement of property in the course of service from causes against which the carrier is not protected by insurance, which are known to be in current operation, and whose effect can be forecast with a reasonable approach to accuracy." In the original the words "other than extraordinary repairs" were inserted after "current maintenance."

The classes of property for which the commission finds that depreciation charges may properly be included under operating expenses are those included in the prior report except that "grading" and "ballast" will be reserved for further study, conclusions to be announced in a supplemental report.

Findings 10 and 11 of the prior report, referring to the renewal of continuous structures, and to "extraordinary repairs," are omitted and finding 2, dealing with the expense of depreciation, is revised to omit the definition of "extraordinary repairs." The report states that the general objections to the provisions with respect to extraordinary repairs "justified our forebodings and made it clear that this particular matter should be dealt with in some other way."

Depreciation to Be Based on Cost

The commission adheres to its original finding that depreciation charges should be based on original cost, although the railroads had urged at the further hearings that they should be based on current replacement cost. It holds that the Supreme Court of the United States in the United Railways case, in which it favored the use of replacement cost as a depreciation base, was not passing upon accounting regulations but was passing upon the adequacy of rates. It does not follow, the report says that the same base should be used in estimating depreciation in terms of money for both valuation and accounting purposes. "We have found that the proper base to use for accounting purposes is original cost to the accounting company. In valuation, the base may be reproduction cost or present value. And aside from this difference in base, the depreciation reserve may have been built up in the past at rates of depreciation which further experience has shown to have been erroneous. Our conclusion is only that the same elements which produce depreciation for accounting purposes likewise produce depreciation for valuation purposes, and they cannot properly be observed and taken into account in the one case and at the same time be overlooked and neglected in the other."

The report also says the commission has never taken the position that property paid for out of revenues obtained as a result of depreciation charges does not belong to the company, or that the company is not entitled to a fair return upon it. "It is not the new property which has been supplied through depreciation charges upon which we believe the company should have no return. It is rather the old property, or service capacity, which has been used up and which the new property has replaced."

It is also stated that the commission is "disposed to abide by the finding in our prior report in favor of the straight-line method" and that "this conclusion is associated with the confidence we entertain that the courts, when the issues and facts are made entirely

clear to them, will recognize the connection and interrelation between depreciation in accounting and in valuation which have been pointed out hereinbefore."

A detailed discussion of the "alternative plan" proposed by J. W. Roberts on behalf of the National Industrial Traffic League is included in the report but the plan was found impracticable.

The entire proceeding was instituted by the commission under Section 20 (5) of the interstate commerce act as amended in 1920, which, required the commission as soon as practicable to prescribe the classes of property for which depreciation charges may properly be included under operating expenses and the percentages of depreciation which shall be charged. The order provides that for the assistance of the commission in prescribing composite annual percentage rates for each of the primary accounts each company shall file with it by September 1, 1932, estimates of such rates based upon estimated service values and service lives, and that thereafter the roads shall keep records which will reflect the service lives and percentage of salvage values, so that they may be prepared to submit new percentage rates to take the place of those found to be inaccurate.

The original report contained 13 findings. In the further report these are reduced to 11. The conclusions and findings are also summarized in a syllabus of 63 numbered paragraphs. Commissioners Aitchison, Tate and Lee did not participate in the disposition of the cases. Some of the principal findings and conclusions are summarized as follows:

If the commission has the power to require depreciation accounting which it has continually asserted and exercised since 1907, obviously the amendment of 1920 gives it complete control over the substance of this accounting.

The amendment does not repeal any of the provisions of the original section 20, but confers specific authority to prescribe percentages of depreciation and directs that this authority be exercised.

The first duty under section 20 (5) is to ascertain and define the classes of property with respect to which depreciation *may properly* be charged, and the second duty is to prescribe the percentages of depreciation which *shall* be charged with respect to each of such classes of property.

Depreciation accounting involves a forecast of the future and the approximation of facts which are not susceptible of precise mathematical demonstration, an exercise of judgment being necessary after the weighing of all relevant evidence.

The determination of an adequate and reasonable depreciation allowance can not be left to the discretion of the carriers, if the public interest is to be properly protected.

The practice which the commission has followed of basing depreciation charges upon original cost to the accounting company is followed generally and the record in these proceedings discloses no instance where, in this country, the replacement cost principle is employed in depreciation accounting.

The substitution of replacement cost or present value in determining the depreciation or retirement charge would involve a radical change in the accounting classifications. Under such practice the investment account would cease to reflect the costs which it purports to reflect.

In the regulation of accounts the commission is performing an administrative function under the authority and direction of Congress and so long as the regulation is not arbitrary, in the sense of being without reasonable basis, there is no ground for judicial interference.

It is not essential that the accounts should correspond in all respects with the facts which may be controlling in a confiscation case.

Future service lives can be estimated with sufficient accuracy, subject to public supervision and to modification and correction from time to time, to meet the needs of depreciation accounting.

The contention that the retirements of most units of a large composite railroad or telephone property tend to equalize, i.e., become the same in amount from year to year, is not adequately supported by data of record. The evidence indicates that the opposition to depreciation accounting is based partly on a desire to avoid an equalization of retirement expenses.

If a company has an expanding business, depreciation accounting will produce somewhat greater charges to operating expenses than will be produced on the average by retirement accounting.

Retirement accounting is a means of postponing charges for loss resulting from depreciation until such loss is fully realized.

It by no means follows that in the long run the public will benefit from retirement accounting, as railroads and utilities which do not have proper reserves or equivalent surplus and are unable to meet changing conditions quickly and adequately impede the progress of the country.

Depreciation accounting becomes a necessary measure of self-protection to the carriers, in view of the decisions of the Supreme Court of the United States to the effect that accrued depreciation must be taken into consideration in ascertaining the rate-base value.

In determining the extent of depreciation the essential question in the case of any class of property is, What is the best approximation that can be made of the loss in service capacity? Ordinarily the answer will be expressed in units of time.

The real measure of depreciation is the extent to which service capacity has been exhausted. Wear and tear, obsolescence, inadequacy, etc., are all factors in depreciation, information as to which constitutes evidence to be given appropriate weight in determining the extent to which service capacity has been exhausted.

Although inspection may be helpful, the best estimate of the exhaustion of service capacity as of a particular date can be made only by a careful analysis of past experience and the application of informed judgment as to future trends; and with the possible exception of the effect of insufficient maintenance, such an analysis will provide a more reliable estimate of the loss in service capacity than observation alone.

The principles are identical which govern the estimating of loss in service capacity for both accounting and valuation purposes. The same elements which produce depreciation for accounting purposes likewise produce depreciation for valuation purposes and they can not properly be observed and taken into account in the one case and at the same time be overlooked and neglected in the other.

Under depreciation accounting the managements will be free, as now, to concentrate repairs and retirements in particular months or years and the accounts will contain, as now, a complete record of such work as and when done. In the place of fluctuating charges in operating expenses for fixed-property retirements there will be substituted more or less equalized annual charges for depreciation.

It is a matter of vital importance to harmonize the requirements for valuation and depreciation accounting purposes, so that unnecessary duplication of effort will be avoided.

The need for a clearer distinction between what constitutes a repair and what constitutes a retirement for accounting purposes, to be met by the publication of appropriate definitions of a unit, with illustrative lists of units and such other explanatory matter as may be necessary, in the respective revised classifications which will become effective concurrently with the order in each case.

The present plan of accounting for track retirements and replacements is inconsistent with the principle that the investment account shall reflect the cost of capital assets and that operating expenses shall not include expenditures for such assets. It is also incompatible with depreciation accounting.

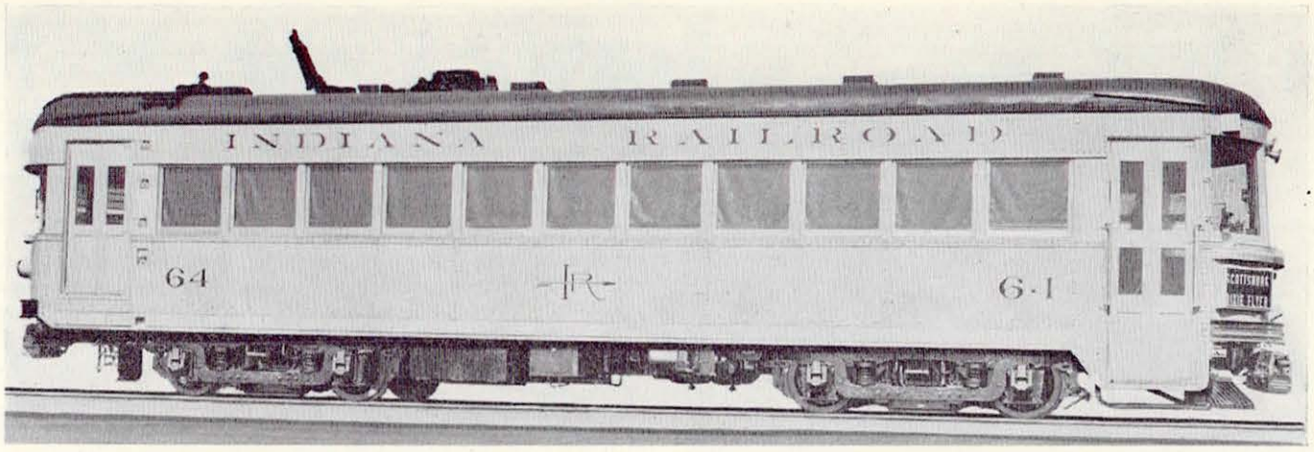
In case a railroad can show that its life is dependent upon a particular source of traffic, that it must in all probability be abandoned once that source is exhausted, and that such exhaustion can be predicted with a reasonable degree of accuracy, then the entire property of that railroad, subject to special accounting provisions, may be classed as depreciable.

The unit and group plans of accounting for depreciation compared and the latter approved. For corporate ledger and balance sheet purposes the depreciation reserve to be regarded and treated as a single composite reserve, but for purposes of analysis carriers required to break down the reserve, as of the effective date of the orders, into component parts corresponding to such primary investment accounts as include property found to be depreciable and thereafter to maintain subsidiary records of the debits and credits thereto by primary accounts.

Impossible to prescribe uniform depreciation percentages for the various classes of depreciable property, applicable to all companies alike. Method of determining depreciation percentages for individual companies prescribed, cooperation with the state commissions in the supervision of this matter being provided for in the case of telephone companies. Both classes of companies required to keep adequate property records and maintain in convenient and accessible form engineering and other data bearing upon prospective service lives, etc.

Verification of the depreciation reserves must depend upon verification of the depreciation rates.

(Continued on page 406)



Multiple-Unit Car Embodying Practically All-Aluminum Body Construction

Electric Line Installs High-Speed Aluminum Cars

Practically complete aluminum structure is the principal factor in a weight reduction of 40,000 lb.

THE increased consideration which electric railways are giving to light-weight equipment and high operating speeds is indicated by the recent purchase of 35 multiple-unit cars equipped with high-speed motors and all-aluminum bodies by the Indiana Railroad System, an electric line which operates more than 5,000 miles of track, largely in Indiana. These cars, 21 of which were built by the Pullman Car & Manufacturing Corporation and 14 by the American Car & Foundry Company, are capable of speeds in excess of 70 miles an hour and are expected to reduce the running time for the 123 miles between Fort Wayne, Ind., and Indianapolis, for example, to slightly over three hours. An equivalent running time will also be maintained for the 117 miles between Indianapolis and Louisville, Ky.

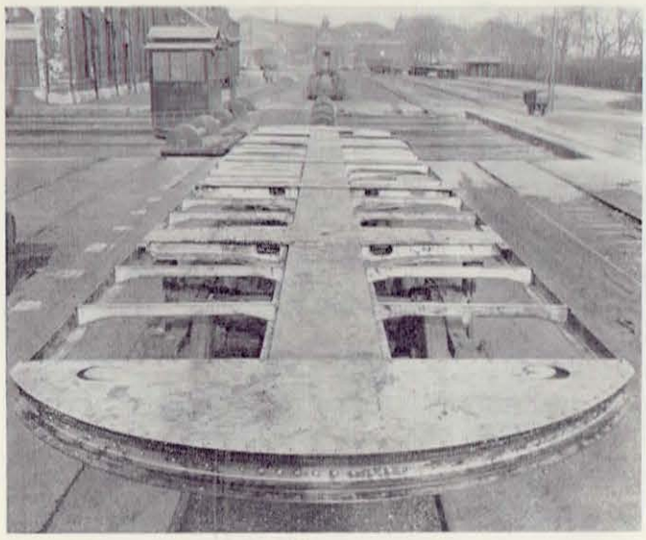
The new cars, designed for interurban service, can be operated in multiple-unit trains, car connections being made by means of the Tomlinson No. 10 car, air and electric couplers, having manually-controlled air-operated uncoupling mechanism. When run as single units, the cars are arranged for one-man operation. The cars are provided with low stream-line bodies and oval roofs. They have flush floors from end to end, the entrance and exit doors being at the front-end vestibules on the right side. The main passenger compartment carries 20 bucket-type fixed seats, each designed to accommodate two persons. The rear platform is arranged for baggage space with an emergency door on the right side. A toilet room with flushing hopper, wash basin and water-cooler is provided.

Fourteen of the cars are equipped with observation-lounge compartments, taking up the rear third of each car and having a seating capacity of 10, with 28 seats available in the coach compartment. The interior arrangement and equipment of all the cars afford maximum convenience and comfort. The coach chairs are upholstered with genuine leather, head and arm rests being provided for complete relaxation. Wide windows afford maximum visibility and produce ample light necessary for a bright and cheerful interior. Circulation of air is provided by means of ceiling ventilators, supplemented by two bracket fans on the front bulkhead.

During the winter months, the cars will be heated by automatic electric heating equipment, designed to maintain comfortable temperatures under all weather conditions. Electric illumination is provided in the cars by means of a double row of scientifically-designed ceiling lights of high intensity which will permit reading without eye strain. The lighting system is designed to provide a steady interior light whenever needed, independent of the trolley voltage. The compartments, decorated in two-tone shading on walls and ceilings, are furnished with thick carpeting, deep, upholstered chairs, solid American walnut tables, reading lamps and a pair of tapestry davenports. These compartments are available to all passengers without extra charge.

Each of the new cars is 46 ft. long between bumpers and has a light weight complete of 50,000 lb., being driven by four General Electric, 100-hp., 600-volt motors mounted on Commonwealth cast-steel trucks of the drop-equalizer type, equipped with Pullmanite journal boxes and American Steel Foundries Simplex multiple-unit clasp brakes. The car design provides an extremely low center of gravity which minimizes side sway as the car travels and makes it readily responsive to the controls. Wind resistance is reduced by the stream lines and rounded contours of the body construction.

Operation of the cars at the high speeds of which the motors are capable is made safe through the use



The Underframe, Built Up of Aluminum Sections

of strictly modern control- and braking devices. Westinghouse standard HL non-automatic control, as well as the Westinghouse single-end safety car-control equipment with back-up feature, is provided, the cars being normally stopped by application of the clasp brakes. In addition, each car has a system of electro-magnetic brakes which creates a magnetic field holding four special brake shoes against the rails and thus further increasing the braking power in emergency. Another safety feature in the control equipment is the provision for automatically shutting off the power and applying the brakes, if, for any reason, the motorman's hand releases the control.

All-Aluminum Car Bodies

Doubtless, the most important single feature of interest about the new multiple-unit car, from the steam-railroad point of view, is the extensive use of aluminum alloys in the car construction, and the methods of fabricating and handling this relatively new material. Practically the only steel used in the car body is the bumpers which are made of this material to meet the requirements of the state law. Many of the specialties, such as the Westinghouse air compressor, also are designed largely with aluminum parts so that aluminum is said to be used to a greater extent in this car than has ever been done before. In general, strong aluminum alloys are used for stress members and softer aluminum for the finished sheets. Since the completion of the car, it has been loaded in excess of the maximum body service load and stresses and deflections of the various parts of the car structures measured under these conditions. The stresses are said to be uniformly low, the deflections being kept strictly within good practice. The action of the car body under loading conditions is uniform, tests indicating that the stresses are well within the desired requirements and that there is a large factor of safety for all parts under operating conditions.

Interior View Showing Double Bucket-Type Seats, Aluminum Interior Finish and Trim

The new body construction is not only lighter but stronger than that of older equipment replaced, which weighed approximately 90,000 lb. per car, or 40,000 lb. more than the new car. All of this reduction in weight cannot be credited to the use of aluminum alloys which, however, are responsible for a large proportion of the reduction.

The center sill is an aluminum pressing ¼ in. thick, extending from bumper to bumper. The side sills are rolled aluminum angles. The body bolsters and cross-bearers are built up of pressed diaphragms and top and bottom cover plates are all of aluminum. Crossties or floor supports and center-sill spacers are provided, all of pressed aluminum.

The body and platform end sills are aluminum pressings, with cover plates on the top and bottom of aluminum extending to the bumpers. Side and end posts are box-section aluminum pressings. Window sills are aluminum pressings. Belt rails are aluminum bars, end belt rails being of the same section but formed to suit the radius of the end of the car. Girder sheets, both side and end, as well as the side and end letterboard, are of aluminum. The letterboard and side plate are in one piece, the sheet being pressed to form the window lintel and side plate. A pressed-aluminum carline is located at each side post, to which a wood carline for fastening the roof boards is bolted. Intermediate wood carlines are provided for ventilator and lamp supports. Hot driven steel rivets are used in the car frame.

The inside finish and headlining are of aluminum, the sheets being formed to the desired shapes and reinforcements spot welded to them for the application of brackets, etc. The toilet and partitions are of aluminum sheets. Continuous basket racks are located on each side of the car, being made of aluminum castings and tubing. The aluminum pressings were all made without heating the sheets. The pressings aided in eliminating rivets and welding. The largest single item of welding is at the joint between the side and end posts and the window sill, which is welded by the metallic-arc process.

Equipment supports under the car are all-aluminum forgings or pressings, formed cold. A pilot is provided under the front end of the car, which is made of aluminum angles and tubing.

Apples exported from New York in the exporting year just closed, totaled ten million bushels, of which 60 per cent came from eastern orchards and 40 per cent from the Pacific coast. Apples from the Pacific coast reach Europe in about 18 to 20 days, as compared with more than twice that time when sent by water through the Panama Canal.

Milwaukee Uses Skids for Handling Freight

ELECTRIC trucks and skids used at the Ocean dock of the Chicago, Milwaukee, St. Paul & Pacific at Seattle, Wash., are showing a net return on the investment of approximately 30 per cent a year. This saving is based upon a sub-normal volume of cargo tonnage in evidence at the present time.

While the use of electric trucks and skids is quite common at a number of important freight terminals, their application to the transfer of freight from rail to water, or vice versa, has required a number of adjustments in design and operation to adapt them to these new uses. The Milwaukee's operation at Ocean dock, with electric lift trucks and a new type of skid, has been attended with considerable success. Five industrial trucks equipped with batteries were installed—two 3-ton low lifts, one 3-ton high lift, and two fork trucks of 3,500-lb. capacity for handling large cases, hogsheads of fish, bales of gunny sacks and other bulky materials. The trucks also serve as tractors, towing trailers when the occasion demands.

All possible freight, both incoming and outgoing, is handled by truck and skid, and the railroad tracks on the inboard side of the pier are provided with a platform at car door level, permitting the operation of trucks into the cars. Freight is loaded on skids which are placed either on the dock or transferred directly to the ship from the truck. Cargo delivered by highway motor truck is also placed on skids and handled to the ship in the same manner.

The experience of the Milwaukee with the ocean traffic demonstrated the necessity for the selection of a skid which could be handled by ships' hoisting equipment in the same manner as a board sling. It suggested the use of a combination skid and sling board. Equipped with four steel reversible legs, with holes in the end to engage the ships' tackle, the new skid answered requirements aboard ship, and at the same time reduced the amount of space necessary for the storage of skids on the dock when not in use.

The skids finally developed have a deck 6 ft. long and 4 ft. 6 in. wide, with four steel reversible legs hinged on bolts through steel U-straps, and 4-in. by 6-in. continuous stringers to which the deck planks are bolted. The hinging of the steel legs permits them to be folded out of the way when the skid is placed on cargo or stored on top of other skids, thus avoiding any possibility of damage from the legs. The stringers extend the entire length of the skid, providing ample bearing area for landing, without damage, on sacks or relatively fragile cargo aboard ship. The deck planks on each of the four corners have been rounded, and a continuous angle-iron binder around the edge of the deck protects the planks from damage and at the same time allows a smooth rubbing surface for the spotting of skids in close quarters.

The use of the combination skid and sling board decreases the number of handlings of a shipment, effecting substantial savings in labor, reducing damage to the cargo, and accelerating the operation. Outgoing freight is loaded on skids, moved into storage, and taken directly from the latter point to the ship's hold. Incoming freight is loaded on to skids in the ship's hold and taken from the hoisting slings to storage or directly to freight cars. Landing platforms are provided on the dock at shipside to allow an electric truck to drop the loaded skid, ready for reversal of the legs, without waiting for the skid to be hoisted aboard ship. Incoming loaded skids can be dropped on to the landing platform to allow reversal of the legs in case a lift truck is not ready to receive the skid.

Skid in Use as a Sling Board Being Hoisted from Electric Lift Truck by Ship's Sling—Reversible Steel Legs of Skid Are Folded Up to Engage Ship's Tackle

Large Savings in Labor Costs

A recent analysis of operations showed that, depending on the quantity and type of commodity, the average labor cost with electric trucks and skids approxi-

Freight on Skids Piled on Dock—Twelve-in. Clearance Under Deck of Lower Skid and Five-in. Clearance Under Deck of Upper Skid Allow Lift Truck to Handle Both Skids at One Operation

mates 80 per cent of the former labor expense for sacked goods, such as dried peas or peanuts, 90 per cent for baled pulp, 60 per cent for case goods, such as canned milk, and 50 per cent for bamboo, a light and expensive cargo to handle.

Report on New Haven Collision

THE Interstate Commerce Commission has issued a report dated July 27, on its investigation of the collision of passenger trains on the New York, New Haven & Hartford on the evening of July 3, last, at New Haven, Conn., when one passenger was killed and 92 passengers and 22 train employees were injured. This collision is of special interest because the engineman, who was at fault, 69 years old and in the service 26 years, is being held for trial on a charge of manslaughter.

Eastbound passenger train No. 86, first section, moving about 10 miles an hour, ran past a dwarf signal set against it, shortly after leaving the station, and collided with westbound passenger train No. 27, the path of which was being wrongfully crossed. Besides serious damage to both locomotives, the first car in train 86—a wooden car with steel underframe—was badly crushed and then was destroyed by fire which broke out in the wreckage. No. 27 had been stopped.

The road at this point consists of four tracks, which are numbered, north to south, 3, 1, 2, 4. Train 86 should have crossed from track 2 to track 1, but the signal (dwarf) was against it, the crossover not having been set; and, passing this signal, the train proceeded along track 2 a few hundred feet until it met No. 27, which was to be crossed from track 2 to track 1 by a more easterly crossover. The engineman of No. 86 makes no clear explanation of how he missed seeing the signal. The fireman makes an equally unsatisfactory statement, saying that while he was at work on the fire he heard the engineman call "jack," indicating that he had received a proceed indication on a dwarf signal. But, though he noticed that the engine seemed to bear to the right instead of to the left, he paid no particular attention to the matter, nor did he observe any of the signal indications. Just before reaching the dwarf signal, the engine had passed the signal tower and the signalman, noticing that the train seemed to be increasing speed unduly, sounded the klaxon horn which requires all trains to stop; but the men on the train aver that they did not hear this signal.

The engineman was entirely familiar with this territory, had operated this train for years and knew that he was under the necessity of observing switch points in order to know which route was lined for his train; also that this train regularly moves over this crossover from track 2 to track 1. He declared that he did not hear the man in the signal cabin call to him.

The signal supervisor testified that the levers controlling reverse signals at this interlocking are tested three times daily.

The fire which destroyed the passenger car was due to some cause not discovered; possibly it was broken pipes in the lighting system or the overhead wires of the electric propulsion system. Among the injured persons four were reported as having suffered burns.

The report in its conclusion calls attention to the greater safety provided by steel cars as compared with wooden. This railroad operates 1,329 steel cars, including 300 Pullmans, but still uses wooden cars, having steel underframes, when traffic is heavy.

The engineman, William A. Rice, had been examined on the rules in June last, and also had his eyes and ears examined; and in September last had a regular physical examination. He has been held for trial on a charge of manslaughter and the case will probably come up in court this month. He is out on $1,000 bail.

Depreciation Accounting Prescribed by I. C. C.

(Continued from page 402)

The present patrons of a carrier can not be required to make up past deficiencies in depreciation charges nor be relieved of any part of their current burden because of past excesses.

For the reasons stated, depreciation charges should be held down to a reasonable basis by conservatism in estimating service lives and depreciation rates.

Depreciation expense being based upon the original cost to the accounting company of the property in question, it follows that depreciation accounting requires an analysis of such cost apportioned to the primary accounts covering depreciable property under road and equipment of steam roads and under fixed capital of telephone companies. The accounts of the steam railway companies in general now furnish no adequate record of property costs, but the deficiency may be supplied, with sufficient accuracy for the purposes of depreciation accounting, by appropriate use of the inventories of the Bureau of Valuation. Rules prescribed accordingly for such analysis of the cost of steam-railroad property. It appears that the investment accounts of telephone companies are, in general, sufficiently adapted to such accounting; but if it should develop that they are not so adapted this matter can then be dealt with.

Since depreciation is a part of expense of operation, this expense exists just as much in the case of property used but not owned as in the case of property owned and used, and within practicable limits should be so treated in the accounts.

Some classes of property are of such a character that it is not practicable to keep individual unit costs. In determining the debits and credits to the various accounts under depreciation accounting, amounts for specific units to be used so far as practicable; but where that is impracticable, average amounts to be used.

While certain causes of the retirement of property are not factors to be included in the estimate of depreciation charges, all losses at time of retirement required to be charged to the depreciation reserve, with provisions for compensating adjustments where necessary.

Carriers required to make an estimate by primary accounts, subject to check and revision by the commission, of the accrued depreciation in their property as of the effective date of the orders.

A TRAVELING EXPOSITION, consisting of 17 large steel box cars carrying exhibits of the most important industries and manufacturers of Mexico, will shortly tour that country. The exposition will go to all important points in the republic and is conceived as an educational plan that will tend to encourage trade in products manufactured in Mexico.

THE GREAT WESTERN OF GREAT BRITAIN has sanctioned the placing of advertisements of an artistic nature in the compartments of its passenger equipment. The first coaches to be used for this purpose will be those forming the standard suburban sets now in use in the London, Birmingham, Cardiff and Chester divisions, and in which two picture spaces in each first, and four in each third class compartment, will be allocated for this purpose.

Communications . . .

Locomotive Bells and Church Bells

South Lancaster, Mass.

To the Editor:

This is a mere sentiment of course, but perhaps there is the utilitarian side. I refer to the din made by the new bell ringers and mentioned in a letter on page 264 of the *Railway Age* of August 15, 1931. A bell of good tone, rung in the old fashioned rhythm, is very pleasant to hear. But when the beats are speeded up according to modern production ideas, the noise is disagreeable. How do you think a church bell would sound rung at that speed?

W. G. Landon.

Commerce Body Urges Trucking Restriction

Portland, Ore.

To the Editor:

I enclose herein a clipping * from the Oregon Daily Journal which shows clearly how at least one Oregon town feels toward the menace of road-hogging truck trains. Much good could be done would other chambers of commerce feel and act as this one has.

W. W. Marsh.

* Editor's Note.—The resolution of the Bend (Ore.) Chamber of Commerce to which our correspondent refers reads in part as follows: "We would urge that the width of trucks permitted to be driven on the state highways be reduced by law, the maximum weight reduced and heavy trailer trucks be absolutely forbidden the use of the state highways."

Train Speeds

Elmira, Ont.

To the Editor:

In the *Railway Age* of August 22, there appeared a news item headed "Canadian Pacific Wrests Train Speed Honors from Britain." I would like to draw your attention to the running time of the Canadian National trains, No. 6 and No. 15, operating between Toronto and Montreal, and vice versa. Train No. 15 runs from Coteau to Brockville, 87.7 miles, in 80 minutes, average speed, 65.8 miles per hour, Coteau to Prescott, 76 miles, in 67 minutes, speed, 68 miles per hour. No. 6 runs from Brockville to Coteau, 87.7 miles, in 78 minutes, speed, 67.5 miles per hour; Prescott to Coteau, 76 miles, in 66 minutes, average speed, 69 miles per hour.

H. D. Angus.

Portable Lights for Meat-Peddlers Cars

Fort Smith, Ark.

To the Editor:

For many years certain trains on the Fort Smith & Western encountered serious delays in the handling of merchandise shipments for points for which set-out cars were not provided, and especially in the handling of meat-peddler cars where trains arrived at stations after nightfall. To overcome this, we had rubber-insulated portable extension cords, about 70 ft. long, made up and turned over to the crews handling the shipments. This arrangement is similar to that shown in the *Railway Age* of August 1, 1931, page 179. In our service, when the train arrived at the station where the cars were to be unloaded, the extension was plugged into the most convenient light socket on the station platform and the light on the end of the cord hung inside the freight car. This method greatly reduced the time formerly consumed by trainmen in locating shipments with the aid of oil lanterns. The result has been a considerable saving of time and money and as most railway depots are now equipped with electric light, it is an easy matter to provide such a service.

L. B. Barry, Jr.,
Receiver, Fort Smith & Western Railway.

Significance of "Commercial Value" in Consolidation Cases

Ann Arbor, Mich.

To the Editor:

The recent decision of the Interstate Commerce Commission in the matter of the unification of the Ulster & Delaware and the New York Central is suggestive of far-reaching consequences, and as a result it is not possible to foretell what the future holds in the matter of regulation. Last year the New York Central made application for a more comprehensive unification of the Michigan Central, the Big Four and others of its principal subsidiaries. The commission granted this request on the condition that several smaller properties which conformed to the commission's general scheme of consolidation be included in the New York Central grouping. Among these were the Ulster & Delaware and the Boyne City, Gaylord & Alpena. The commission's grant specified that each subsidiary was to be acquired at its "commercial value", and in order to determine this value a board of arbitrators was selected by the interested parties.

In the case of the U. & D., the arbitrators reported $4,100,000 as the proper sum. The commission's official final valuation of this road is $6,468,019. Upon reviewing the findings of the arbitrators, the commission set aside the figure of $4,100,000 and substituted, therefore, a sum of $2,500,000, stating that the conclusion of the arbitrators was only advisory, since the commission could not delegate the function of determining the commercial value. As to the qualifications of the members of the board of arbitrators, it is probably safe to say that it would not be possible to obtain a more competent board.

In the case of the Boyne City, Gaylord & Alpena, an equally competent board found a sum of $1,392,293. The commission's official tentative valuation for the properties is $1,706,500, with prices as of 1910-14. This case was reviewed by Examiner J. V. Walsh, who recommended that the commission set aside the findings of the arbitrators and adopt the figure of $345,000. Viewed in the light of the action of the commission in the case of the Ulster & Delaware, it is to be expected that the commission will adopt the recommendations of Mr. Walsh, and there seems to be little doubt that the findings of the arbitrators will be set aside.

The questions that have been raised by these decisions, which are of no small importance, are as follows:

(1) At the time the commission establishes a final value for the properties making up the New York Central System, giving due consideration to the Supreme Court decision in the St. Louis & O'Fallon case, will the final valuation for the U. & D. be $2,500,000, or approximately $6,468,019? And in the case of the B. C. G. & A., will this figure be $345,000 or an amount approximating $1,706,500?

(2) If the commission uses the recent commercial value of these two roads, can it use other than a comparable figure for the many other similar properties which make up the New York Central System? Also, will it not be necessary to use similar values for all other railway properties?

(3) If consolidations are predicated upon "commercial values" officially declared by the commission and later these same properties, as a part of a consolidated system, are valued by the commission at amounts approximating its official tentative valuations, large profits will accrue to the consolidated

companies. Will such a procedure be approved or tolerated by the Supreme Court?

(4) Will the decision of the commission in the case of the U. & D. and in similar situations be of benefit to the railroads or to the public?

(5) Since the commission can exercise only such power as has been conferred upon it by Congress, may not the question be raised that the commission has acted entirely beyond any power which it possesses?

The conclusion that the decision of the commission in the case of the U. & D. is of questionable propriety is supported by the fact that it was established by a vote of six to five. From a preliminary study of this decision, it would appear that it may become one of the most far reaching decisions that the commission has ever handed down.

JOHN S. WORLEY,
Professor of Transportation Engineering,
University of Michigan.

Railroads Have Their Faults, But Principal Blame Is Not Theirs

CHICAGO.

TO THE EDITOR:

Old railroad men were no doubt much amused at the letter (published in your issue of August 29) from Edgar J. Mack, Jr., aged 22, of Cincinnati, Ohio, in which he severely criticised the railroads for their shortcomings as compared to those of trucks, buses, airplanes and water carriers. Amused, that is, not so much at the youthful cocksureness of Mr. Mack, as at the thought of the hot spot on which he places the managers of our rail carriers.

It is true that lack of foresight on the part of railroad managers is in a measure responsible for the present state of affairs. The giants of the business, in the days of construction and early operation, were apparently more interested in immediate than in future profits. This attitude naturally resulted in railroad regulation, and the managers of the following era were so busy defending themselves and their properties from the onslaughts of the various commissions that they had little time for progressive action. They, however, were not entirely innocent; for, if they had realized that a counter-attack is the best defense, and had waged a more vigorous warfare on railroad baiters, it would not now be so difficult for their successors to carry on.

Be that as it may, they laid supinely down to the commissions; and, as a result, it is now the principal duty of the present generation of railroad managers to undo the havoc wrought by excessive and unreasonable railroad regulation.

Though suffering from myopic vision at a time when foresight and radical action would have saved the situation, many managers now realize as well as young Mr. Mack that certain innovations must be introduced in the railroad business; but their hands are tied and they must free themselves before attempting to apply the necessary remedies.

I was struck by the serious and sincere tone of Mr. Mack's letter; but I noted that, like most young men, he subordinates safety to speed, and, to the disparagement of rail carriers, calls attention to the fast time attained by airplanes. He says he "hopped off a train in Wyoming, and flew, comfortably and coolly to Chicago in less than twelve hours." Comfortably and coolly, 'tis true, but not as safely as on a passenger train! The fact that the railroads have recently attained a degree of safety which is little short of 100 per cent is not a mere accident and is a consideration which must not be overlooked. The natural law of compensation, which says that the dancer must pay the fiddler, works as immutably in travel as in all other activities of life. 'Tis a very fine thing to travel, "comfortably and coolly," in a fast airplane; but, when the plane begins to fall, as planes frequently do, one would be more than pleased to swap a little of his comfort and coolness for a seat in a prosaic parlor car.

Like most men who are not actively engaged in railroading, Mr. Mack lays greatest stress on passenger traffic and aims his most poisonous darts at the facilities which the railroads have provided to handle that branch of the business. It would probably surprise him to learn that railroad owners and managers would gladly turn over all passenger business to airplanes and buses if by so doing they could rid themselves (without loss) of their enormous investment in passenger equipment, stations and terminals. The cost and operation of the train, alone, is considerable; but, when we consider the millions of dollars invested in expensive lands, wayside stations, and mammoth terminal buildings, we must conclude that passenger carrying is not a very lucrative business at best.

Touching upon the question of excessive rates, Mr. Mack says, "I paid over eighty dollars for a state room (on a crack passenger train), when for a delightful double room, beautifully furnished, I paid eighty dollars for a week-end cruise on the Berengaria, which included fine food, etc." But, Mr. Mack omits to say, the owners of the Berengaria, because of poor business in the transatlantic trade are ekeing out their revenues by carrying week-end passengers at ridiculous rates, the latter course being the lesser of two evils.

Mr. Mack touches lightly upon the question of freight traffic (the most important of all), being content to say that his father, a manufacturer, ships his product comparatively short distances by truck and barge, thereby making a considerable saving in tariff charges and at the same time securing better service.

The superiority of truck and even barge service over short distances is a fact which no fair-minded railroad man will deny; but the question at issue is not the fact itself, but the responsibility for the circumstances which make such a condition possible. Mr. Mack, young as he is, knows, but fails to say, that the people (including his father) are taxed, directly or indirectly, for the dredging and maintenance of all waterways and for the construction and maintenance of our system of hard roads. Small wonder that barges and trucks are able to offer such cheap rates! On the same terms the railroads would be willing to scrap their rails and assume the obligations of all barge and truck franchises; or, if the people will assume the cost of constructing and maintaining railroad roadway, the railroads will furnish all necessary speed, cheaper rates, free pick-up and delivery service, and, for good measure, will equip their trains with cars and engines constructed of precious metals and trimmed with diamonds. What could be fairer?

To conclude with the question of freight rates, let Mr. Mack tell his father this: For every pound of freight he has diverted from rails to water and highways, he will, eventually, pay through the nose in the form of higher rates for his long-distance carload traffic. Let him congratulate himself now, for his day of reckoning is not far ahead. It requires just as much rail and just as many ties to transport one car as one million cars; and, admitting that fact, one does not have to be educated in higher mathematics to determine that rates must go up if volume of traffic comes down. That's that.

In decrying the lack of progress and advancement in the railroad business, Mr. Mack makes a naive admission. "I, at twenty-two," says he, "cannot remember when railroad cars looked any different." Glimpsing this flaw in his armor, we let fly with the reply that at twenty-two he does not remember the little diamond-stacked coffee pot which has been displaced by the comparatively speedy and powerful locomotive of the present day; he does not remember the link and pin coupling, hand brakes, 50-lb. iron rail, or the first use of the closed vestibule and the six-wheel truck; he has only a faint recollection of the development of the steel car; and, fortunately for him, he is too young to recall the horrible wrecks which caused the Interstate Commerce Commission to prescribe a twenty-hour schedule in place of eighteen at the time when the Pennsy and Central were racing in competition for passenger business between Chicago and New York.

All of these things Mr. Mack is too young to remember; and, because of that fact, he is not competent to judge the accomplishments of those engaged in the railroad business. He has, however, one advantage. Being only twenty-two today, he will no doubt live to see the railroads emerge, victorious, from their present dilemma, while I, considering my advanced age, will probably be dead and gone—unless Congress and the Interstate Commerce Commission, at some early date, decide to quit talking and *do* something about it.

G.M.

Odds and Ends . . .

There Ought to Be More People Like These

According to the Knoxville (Tenn.) Journal, Mr. and Mrs. J. W. May and their four children recently waded across the Clear Fork river at Holton, Tenn. in order to catch Southern train No. 17.

Joke-of-the-Week Department

"Unlike railroads in their pioneer days, and aviation and steamship lines, the motor bus has never enjoyed the helping hand of Uncle Sam or the various states, but has paid its way in taxes from the time the first bus was placed in service."—From a leaflet of the National Association of Motor Bus Operators.

"Santa Fe Service De Luxe"

The Santa Fe Magazine, with pardonable pride, tells of a passenger on Train No. 2 near Winslow, Ariz., who dropped her wrist watch out of the window when the train was about two miles west of town. Notified of the loss, Thomas Walsh, motor car maintainer at Winslow, sped out over the line in his track motor car, picked up the watch and returned it to the passenger before Train No. 2 continued on its journey. The only way in which the Santa Fe might have improved upon this service would have been to have someone along the right of way to catch the watch as it fell, flip the last car and return the watch to the lady even before the train got to Winslow.

Railroad to Enter Sacred City

Sogamozo, or Sugamuxi, the sacred city of the Chibchas Indians, which contains the ruins of the famous Temple of the Sun, is soon to be connected with Bogota, Colombia, by the 152-mile Northeast railroad, under construction by a Belgian concern. When completed the line will run from Bogota to Sogamozo and later will be extended to Bucaramanga, 300 miles from Bogota. Sogamozo, the modern name for the sacred city, was founded by the Chibchas whose civilization is considered by historians to have been equaled in North and South America only by the Indians of Mexico and Peru. There they constructed their Temple of the Sun, which was so rich in gold and jewels that it is reputed to have been the original El Dorado—the goal of scores of Spanish expeditions to Central and South America.—From the New York Herald-Tribune.

Think of the Per Diem!

Here is a record for other freight cars to shoot at. Central Vermont automobile car No. 41488 is one of one thousand automobile cars constructed in April, 1929, at Pittsburgh, Pa., for the Central Vermont's New England automobile traffic. Immediately upon its completion, however, C. V. 41488 was placed in service on the Grand Truck Western lines in Michigan, and for 28 months thereafter it was a total stranger to the rails of the railroad which owned it. During these 28 months, C. V. 41488 traveled 38,500 miles, its travels having taken it through every state in the Union and every province of Canada, with the exception of Nova Scotia, and even into the state of Chihuahua in Mexico. Like the Prodigal, C. V. 41488 recently made its first visit to its home station, St. Albans, Vt., for a brief vacation and for minor repairs.

Although designed especially to transport automobiles, the car has carried many commodities. On one trip, after carrying motor cars to Duluth, Minn., it took on a load of pulp wood, which it carried to mills in Northern British Columbia. It was then "deadheaded" to the coal fields of Alberta for a cargo of Alberta coal, which was taken to the wheat-growing district of Manitoba. After the coal was unloaded and the car had been cleaned out, it was reloaded with wheat for Ontario grain elevators. After being "deadheaded" to Detroit, C. V. 41488 took on another load of automobiles for Southern New England.

Can anyone advise us of other freight cars whose records match or exceed that of C. V. 41488?

R.S.M.A., Please Note

We only recently learned of the existence of a branch of the railway supply industry in—of all places—Greenwich, Conn. Here in the middle of an eight hundred thousand dollar estate is a small factory where Milton Cronkhite and Harmon B. Vanderhoef, Jr., make a business of manufacturing models of locomotives, cars, tracks, bridges, signal systems, switches and all that sort of thing. Surprising though it may seem to older members of the railway supply fraternity, the demand for this kind of railway equipment exceeds the supply.

Of course, Cronkhite and Vanderhoef operate and maintain a miniature railroad of their own, which reproduces ordinary railroad operation in every respect except that they are not bothered by truck competition.

We understand that Cronkhite and Vanderhoef are preparing for exhibit at the Century of Progress exhibition in Chicago in 1933, a complete four-track reproduction of the Altoona-Johnstown section of the Pennsylvania, with everything from grades, tunnels and bridges to stations, freight yards, and roundhouses.

At present the cost of a small system complete, but with only two trains, is in the neighborhood of $2,000. The partners hope to reduce this to $500. A locomotive costs slightly over $250, and a Pullman car $25.

Dedicated to "Order Three" Department

"Oh, what is a unit?" a youth was asked
As he stepped from his college halls.
"A unit, a measure, sir," said he,
"Of any commensurable quantity."
Then he ventured forth in confident glee,
And landed a job in "Order Three."

Then he sent for "Instructions—Supplement Four,
Second revised", then "revised" some more.
And he studied the "unit book" o'er and o'er
Till his head was dizzy, and his back was sore,
His knees grew weak and his eyes grew dim—
And a "unit" was never the same to him.

"Oh, what is a unit?" The question grew,
And the answer was always something new;
And the youth soon learned to his consternation,
That a "unit" is governed by "Classification."
Is it "Road and Equipment" or "Operation?"
And that all depends on "Interpretation."

Is it "each" or "pair" or "hundred weight,"
"Cubic Yards" or a "load" of sand?
Is it "M.B.M." or "hundred feet,"
"Square feet" or an "acre" of land?
Is it "each" or "pounds" or "barrel" or "sack,"
And how many "joints" in a "mile of track?"

Is it called "track miles" or "lineal feet?"
Just look in the book and see.
For it's all quite plain to "Order Three,"
When clearly "restated" by the I.C.C.
But the youth went "dippy"—he never could tell—
So they put him away in a padded cell.

ANONYMOUS*

* But E. R. Woodson, secretary and treasurer of the Railway Accounting Officers' Association, is suspected.

NEWS

Rates on Furniture Revised by I. C. C.

Class-rate basis to supersede, in general, existing commodity rates

A general revision of freight rates on furniture throughout the country, following an investigation as Part 5 of the general rate structure investigation under the Hoch-Smith resolution, has been prescribed by the Interstate Commerce Commission in a report and order made public September 3, to become effective on February 25, 1932. By placing the rates generally on a class-rate basis in place of existing commodity rates the commission has made possible a revision which would be generally upward but the rates prescribed are maximum reasonable rates and Commissioner Eastman, concurring in part, expressed doubt as to whether the maximum rates can be maintained with any uniformity under the competitive transportation conditions which now exist.

Various formulas proposed by furniture interests were found not justified, as were some increases proposed by the railroads on special classes of furniture; but whereas the furniture interests had taken the position that there is an existing depression in the furniture business which warrants no increases and requires many reductions the commission referred to the decision of the Supreme Court that the Hoch-Smith resolution does not make unlawful any rate which, tested by the interstate commerce act itself, is a lawful one. "Even assuming that Congress might competently do so," it said, "it has not invested us with power to transfer distinctly commercial distribution handicaps to the carriers by prescribing freight rates lower than those which would otherwise be just and reasonable for the particular character of traffic."

For eastern territory the commission prescribes as maxima the second-class rates prescribed in the eastern class rate case for carload shipments of furniture rated second class in the Official Classification. For western trunk line, southwestern and southern territories the general basis is third class rates for furniture rated as third class in the classifications and rates equal to 77.5 per cent of the first-class for furniture rated second class. Various rather complicated findings are also made for special classes of furniture for l.c.l. shipments and for inter-territorial movements. Commissioner Eastman objected to giving furniture lower ratings in southern and western territories than in eastern territory, particularly as it is a high-grade, light-loading commodity.

R.B.A. Advances Meeting Date

The Railway Business Association, advancing the usual date a fortnight, will hold its annual meeting and dinner at the Hotel Stevens, Chicago, on Wednesday, November 4. Dinner reservations as of September 10 were less than two per cent under 1930 at the corresponding stage.

Erie to Lease Refrigerator Cars

The Erie has entered into an agreement with the General American Tank Car Corporation whereby the latter company will furnish refrigerator cars for the entire railroad system; and the General American will also operate the refrigerator cars now owned by the Erie.

Petroleum Rate Revision Postponed

The Interstate Commerce Commission has postponed from October 15 to December 3 the effective date of its general revision of freight rates on petroleum and its products prescribed in Part 4 of the general rate structure investigation. The postponement was granted on petition of the roads in Official Classification territory to make the date coincide with that of the general revision of eastern class rates.

Gulf Cotton Rates Protested

A petition for the readjustment of alleged discriminatory cotton rates from west Texas to Texas Gulf ports has been filed with the Texas Railroad Commission by the South Plains Freight Rate Association and the West Texas Chamber of Commerce. Immediate relief is asked so that the bulk of the present cotton crop may benefit.

A complaint against existing rail rates on cotton moving from interior points in Louisiana to the ports of New Orleans and Lake Charles, has been filed with the Louisiana Public Service Commission by the Lake Charles Association of Commerce, the Lake Charles Harbor and Terminal District commissioners, and others. The complaints say that the existing rates are as high or higher from interior points in Louisiana to Lake Charles as from the same points to New Orleans, which is a greater distance. The Public Service Commission recently authorized the railroads to lower the existing rates, but this move was opposed by the Lake Charles port commissioners on the ground that they were also discriminatory, and the authority was enjoined by court order.

Buses Unduly Favored by Mississippi Taxes

Railways pay $4,000,000 annually; highway carriers, $18,000, says state auditor

The contrast between the $4,000,000 in annual taxes paid by railroads operating in Mississippi and the $18,000 collected each year from bus lines is vividly drawn by State Auditor Carl C. White in a recent statement embodying "information that every man, woman and child in Mississippi should know during this serious transitional period in the mode of transportation through which we are passing." From figures cited Mr. White deduces that the railways of Mississippi, in addition to the $4,000,000 paid in taxes, must, in order to realize a five per cent return, collect an additional $4,700,000 in revenues from Mississippi traffic—a total of $8,700,000. The State, he continues, spends each year $7,000,000 on its highways while the bus lines must earn only $18,000 for taxes plus a return on their investment in order to operate profitably. From this set up Mr. White ventures the suggestion that "the taxes among these three interested parties are not equally distributed."

Mr. White's statement, as reported in a recent issue of the United States Daily, follows in part:

"The railroad companies in Mississippi, in addition to the fact that they have spent millions of dollars in building their right of ways and are spending millions of dollars every year maintaining their roads, pay a direct tax to the State of a little less than $4,000,000. And in addition they have thousands of employes in the State of Mississippi located in all of the cities, towns, and villages along the railroad lines, who are not only taxpayers, but good citizens taking their places in all of the civic and social activities of these various communities.

"The bus lines in the State of Mississippi, and I am not talking about school buses in the local communities, but about bus lines that cross the State and freight lines maintained by the bus companies, have paid taxes in an amount of a little less than $18,000 in Mississippi during this year. They have but little if any tangible property that can be taxed by the State. They employ but few men in the entire State. It is conceded that these bus lines and the big freight lines running over the highways of Mississippi do more damage to our highways than 50 cars will do, and more than that.

"The total assessed valuation of the State of Mississippi is $742,504,531. Of this amount $120,894,393 is assessed against all utility companies. This includes telephone and telegraph companies, and various other utility companies that are assessed in the State as well as the railroad companies. But of this amount $95,235,782 is assessed against the railroad companies. In other words one-eighth of the entire assessed valuation of the State of Mississippi is assessed against the railroad companies. They, therefore, pay one-eighth of all of the taxes that are paid in the State.

"Now to summarize—the taxpayers of the State, so to speak, are paying a tax or privilege, whichever you are pleased to call it, of $7,000,000 per year in order to have highways over which motor-driven vehicles may travel. In addition to this amount the passenger car owners in the State pay nearly $3,000,000 in road and bridge privilege tax for the privilege of using these roads, while the bus lines pay only $18,000 per year. The railroad companies in the State, in addition to the interest they pay on an investment of over $95,000,000, pay a direct tax to the State of a little less than $4,000,000.

"In addition to the $4,000,000 taxes paid to the State of Mississippi by the railroad companies 5 per cent on the $95,000,000 investment which the State of Mississippi has them assessed with would amount to $4,700,000, making a grand total of $8,700,000 that the railroad companies have to make in Mississippi as profit in order to continue in business.

"Suppose they reach the place where they are unable to make this much profit, and I am reliably informed that they are about to reach this point in the career of the railroad companies' business in Mississippi.

"They would have to turn the roads over to the Federal Government, and if the Federal Government operates the roads in any State they do not, of course, pay any taxes. Then the burden of the $4,000,000 taxes that the railroad companies are now paying in Mississippi would have to be paid by the taxpayers of Mississippi. In other words the property owners would have to pay in addition to the taxes they are now paying this $4,000,000 each year, or one-eighth of the amount they are now paying more than they are called upon to pay at the present time."

Cancel Annual Meeting of Motor Transport Division

The general committee of the Motor Transport Division, American Railway Association, has decided to cancel the 1931 annual session of the division, which was to have been held in Chicago during the latter part of this year. A circular issued to the members of the division by A. P. Russell, executive vice-president of the New York, New Haven & Hartford, and chairman of the division, reads as follows: "Owing to prevailing economic conditions, necessitating the curtailment of expenses, the general committee has decided to cancel the 1931 annual session of the division. The officers and members of the general committee, however, will keep in close touch with the affairs of the division, through the regional chairmen of the Motor Coach, Motor Truck and Rail-Motor Car sections, and be prepared to call a member road meeting, or such committee meetings as may seem necessary, at such time in the future as conditions require."

Tank Cars for Milk

Transportation of milk in large tanks, both on railroad cars and on motor trucks, has many advantages over moving the milk in cans, according to the Department of Agriculture's recent bulletin, No. 243-T, which gives the results of a study of this branch of transportation. Better temperature control of the product, more favorable sanitary conditions, smaller investment in cans, less loss of milk, less labor at country plants, the handling of more milk in the same area by the city plant, saving in washing powder and in man-hours required for washing, and a decrease in floor space required in country plants, are the principal advantages of tank hauling. It is found that some cities receive from 70 to 95 per cent of their fluid milk in tanks.

Data were gathered from various sources on 300 tank trucks and 53 tank cars. Operators of tank trucks say that the economical limit of the use of this power is from 120 to 150 miles per round trip.

Among the illustrations in the pamphlet are one of a truck with a 2,000

(Continued on page 418)

They Must Be Saved

"In the railroad rate hearing there is a situation akin to the meeting of an irresistible force with an impenetrable object—if the allegations of both sides are correct. The railroads are in need of greater freight revenues, but rates are now all the traffic will bear.

"If the side that is resisting the increase in rates were a co-ordinated enterprise, capable of adopting a fixed policy and of enforcing it, there would be an element of inconsistency in its position. It concedes the vital necessity of rail transportation. It does not find in highway or water transportation a complete substitute for railways. But it gives to the railroads the traffic that it must give them and resorts to their competitors if rates are lower or convenience better. It cannot get along without railroads, but it saves money by dividing traffic with the trucks, and refuses to meet the consequences that this diversion inflicts upon the railroads.

"This is not an indictment of an organization of producers or shippers. There is no organized policy among them, but an individualistic and natural inclination. One buys transportation where one can buy it cheapest. One does not reflect upon the fact that railroads are the basis of vast tax revenues, vast employment, and enormous investment. Or that if an essential medium of transportation is destroyed by diversion of business from it to a less essential medium of transportation, the pecuniary saving incident to that diversion is bound to be but temporary.

"There is, or ought to be, room in our transportation scheme for both highway and rail carriers. The need is to bring the former up to parity with railroads in their responsibilities to the public. Whether to put them on a proportionate equality with railroads in payment of taxes and to regulate them as rigidly as to rates and returns upon investment would solve the difficulties of the railroads cannot be definitely stated, but such a course would without doubt alleviate the situation that confronts the rail lines.

"Attempts have been made to regulate truck carriers in this and other states. The truck as common carrier is in Oregon under the regulation of the public utilities commissioner as to convenience of schedules, rates, and other particulars. But the truck common carrier, dissatisfied with regulation, can apply to the secretary of state and obtain a license as a contract carrier and to all intents and purposes relieve itself from regulation.

"The emergency that confronts the railroads might be overcome by a return to normal business and industrial conditions, but it must be realized that they are suffering not alone from the depression. Their business is suffering from the attrition of an unequalized competition —a competition which, if it destroys the railroads, cannot wholly take their place.

"The poverty of the railroads has worked its distress upon those who obtain their livelihood from them. The railroads have put on furlough 350,000 men; of the remaining 1,330,000 men, 40 per cent are on part time. Their loss in wages has been of incalculable effect in depressing the conditions of trade and industry. The railroads are as well worth saving as is any other factor in employment, business, industry, and financial stability."—From the Morning Oregonian, of Portland, Ore.

Revenues and Expenses of Railways

MONTH OF JULY AND SEVEN MONTHS OF CALENDAR YEAR 1931

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Akron, Canton & Youngstown	July	171	$142,055	$56	$149,307	$23,304	$15,649	$10,884	$47,935	$9,619	$107,391	71.9	$41,916	$29,745	$12,281	$39,915
	7 mos.	171	1,116,276	506	1,173,471	149,420	118,816	85,351	360,561	94,318	807,993	68.9	365,478	277,240	174,062	306,363
* Alton Railroad	July	1,028	1,342,502	252,041	1,764,592	217,314	294,301	74,098	658,971	61,789	1,273,221	72.2	491,371	363,976	194,578	144,263
	7 mos.	1,028	8,435,979	1,971,961	11,603,703	1,288,399	2,323,126	492,905	4,633,914	431,957	9,248,069	79.7	2,355,634	1,531,604	432,236	247,455
Alton & Southern	July	30	.....	.....	95,919	8,600	9,589	5,097	34,859	5,415	63,560	66.26	32,359	22,239	19,406	28,124
	7 mos.	30	.....	.....	646,751	66,511	50,988	35,776	240,162	33,566	427,003	66.02	219,748	153,522	142,369	161,337
Atchison, Topeka & Santa Fe	July	9,670	14,080,167	2,022,430	17,217,897	1,882,807	2,867,863	366,046	4,271,563	412,684	9,731,865	56.5	7,486,032	5,593,835	5,680,364	6,059,453
	7 mos.	9,658	68,124,588	13,439,422	89,669,525	13,026,217	19,927,415	2,803,658	28,715,631	3,039,115	67,353,560	75.1	22,315,965	14,176,276	14,249,136	16,889,792
Gulf, Colorado & Santa Fe	July	1,976	2,545,317	104,570	2,742,099	237,409	383,896	53,790	631,260	96,831	1,401,638	51.1	1,340,461	1,242,605	1,123,765	1,322,202
	7 mos.	1,976	9,810,188	633,492	11,134,543	1,870,238	2,532,246	401,215	3,869,841	592,768	9,244,861	83.0	1,889,682	1,204,906	423,870	910,840
Panhandle & Santa Fe	July	1,876	1,733,610	65,070	1,870,962	139,695	221,372	17,765	345,630	35,860	757,855	40.5	1,113,107	1,059,763	944,288	800,854
	7 mos.	1,789	6,076,894	445,098	6,999,157	1,167,095	1,534,641	142,390	2,154,211	263,434	5,237,618	74.8	1,761,539	1,373,315	628,606	657,948
Atlanta & West Point	July	93	101,321	29,806	151,292	18,187	31,524	10,297	64,657	11,838	140,627	93.0	10,665	—827	—11,904	—9,749
	7 mos.	93	755,652	209,820	1,125,469	147,420	219,252	73,761	465,037	82,275	1,013,795	90.1	111,674	30,237	—35,235	41,657
Western of Alabama	July	133	101,300	31,521	149,092	19,437	38,153	11,274	60,890	11,432	144,791	97.1	4,301	—6,164	—1,070	12,788
	7 mos.	133	826,014	223,134	1,177,592	174,774	279,204	78,700	439,864	84,132	1,079,966	91.7	97,626	15,939	57,163	191,682
Atlanta, Birmingham & Coast	July	639	286,963	12,503	326,878	64,417	70,451	26,016	141,234	20,345	331,775	101.4	—4,897	—20,825	—45,108	7,929
	7 mos.	639	1,784,742	75,570	2,082,967	503,117	517,341	187,817	990,336	137,336	2,403,277	115.3	—320,310	—432,604	—572,130	—404,386
Atlantic Coast Line	July	5,162	2,632,003	373,881	3,319,153	655,548	907,373	143,580	1,547,930	167,182	3,444,035	103.8	—124,882	—425,368	—374,395	12,804
	7 mos.	5,162	28,534,713	5,767,775	37,691,511	5,000,633	6,676,974	1,049,055	12,856,259	1,221,612	27,157,469	72.1	10,534,042	7,081,335	5,669,975	5,774,015
Charleston & Western Carolina	July	342	201,927	4,480	213,092	37,405	31,689	7,012	74,176	6,381	155,557	73.0	57,535	40,015	36,875	26,588
	7 mos.	342	1,501,999	34,385	1,588,896	252,636	207,581	51,255	568,372	44,432	1,122,563	70.7	466,313	322,290	287,873	136,561
Baltimore & Ohio	July	5,653	11,532,389	1,370,260	13,897,109	1,261,834	2,631,334	537,382	4,902,548	674,757	10,168,998	73.2	3,728,111	2,951,096	2,719,654	3,649,079
	7 mos.	5,653	80,223,990	9,111,074	96,250,002	8,602,814	20,809,991	3,594,417	36,117,895	4,653,460	74,854,108	77.8	21,395,894	16,107,266	14,247,903	21,371,934
Baltimore & Ohio Chicago Term.	July	85	.....	.....	304,205	38,439	35,611	2,203	139,734	17,052	238,496	78.4	65,709	14,901	95,600	91,562
	7 mos.	85	.....	.....	1,868,946	226,617	228,051	16,037	972,821	128,371	1,611,530	86.2	257,416	—72,342	559,887	639,849
Staten Island Rapid Transit	July	23	47,361	145,531	202,230	13,188	17,442	2,339	92,739	20,671	146,379	72.4	55,851	38,751	25,402	41,021
	7 mos.	23	392,669	823,709	1,277,221	90,642	97,116	14,572	643,912	116,322	962,564	75.4	314,657	192,457	96,581	176,011
Bangor & Aroostook	July	619	200,805	21,617	245,717	124,234	115,035	5,417	111,322	28,653	387,491	157.7	—141,774	—154,847	—139,785	—70,812
	7 mos.	619	3,975,166	277,711	4,438,798	865,778	838,987	40,413	1,085,920	197,463	3,043,403	68.6	1,395,395	1,021,528	1,010,246	1,617,526
Belt Ry. Co. of Chicago	July	53	.....	.....	465,384	28,316	48,500	3,631	223,731	9,763	313,941	67.5	151,443	74,895	102,982	157,894
	7 mos.	53	.....	.....	3,165,636	184,485	303,342	25,044	1,505,721	70,306	2,088,898	66.0	1,076,738	598,083	832,946	1,070,615
Bessemer & Lake Erie	July	227	1,216,628	1,749	1,229,515	121,163	25,151	12,747	228,510	38,328	428,168	34.8	801,347	765,623	745,512	947,224
	7 mos.	227	5,047,898	17,466	5,151,534	743,742	1,525,025	96,513	1,456,273	261,190	4,092,837	79.4	1,058,697	772,747	733,047	2,428,612
Boston & Maine	July	2,089	3,115,364	1,116,136	4,904,588	715,385	651,426	86,464	1,801,601	197,452	3,473,760	70.8	1,430,828	1,140,715	945,961	1,006,536
	7 mos.	2,089	23,084,851	7,040,120	35,061,893	5,338,016	4,909,776	591,481	12,996,389	1,538,887	25,510,946	72.8	9,550,947	7,687,892	6,147,982	6,770,971
Brooklyn Eastern Dist. Term.	July	11	106,300	.....	107,308	11,975	13,906	488	33,013	5,891	65,273	60.8	42,035	35,631	35,631	32,117
	7 mos.	11	726,626	.....	736,902	72,673	81,452	4,294	229,404	40,830	428,653	58.2	308,249	260,609	260,609	268,427
Buffalo & Susquehanna	July	253	101,521	303	115,398	25,347	24,325	1,909	32,070	6,872	90,523	78.4	24,875	22,798	27,210	39,975
	7 mos.	253	807,867	2,907	906,586	178,102	229,280	14,555	270,789	49,171	741,897	81.8	164,689	149,989	201,095	230,439
Buffalo, Rochester & Pittsburgh	July	601	1,044,412	33,597	1,120,322	146,308	286,260	27,061	419,702	39,387	920,124	82.1	200,198	180,196	124,200	170,309
	7 mos.	601	6,950,451	249,503	7,463,587	917,463	2,020,959	196,881	3,024,892	279,374	6,451,597	86.4	1,011,990	870,765	809,752	1,161,277
Burlington-Rock Island	July	310	226,867	4,342	237,580	21,182	18,311	6,729	54,293	10,112	110,001	46.3	127,579	121,498	108,092	39,697
	7 mos.	350	794,238	19,138	856,206	177,555	116,629	46,013	374,406	73,786	783,730	91.5	72,476	20,515	—140,722	—737,219
Canadian Pac. Lines in Maine	July	233	76,749	24,511	113,248	108,491	31,157	7,249	65,883	3,590	216,370	191.0	—103,122	—115,122	—127,771	—52,229
	7 mos.	233	1,140,246	155,036	1,383,815	351,422	314,016	54,788	620,332	29,549	1,370,107	99.0	13,708	—70,292	—214,348	—127,075
Canadian Pacific Lines in Vermont	July	85	68,521	32,505	126,053	17,296	27,050	2,174	72,039	2,256	120,815	95.8	5,238	1,218	—23,984	—28,970
	7 mos.	85	521,663	152,746	826,253	137,574	195,619	15,333	539,813	18,580	906,851	109.7	—80,598	—108,738	—296,930	—264,530
Central of Georgia	July	1,944	1,342,479	157,681	1,620,221	179,910	293,068	67,724	683,328	82,248	1,310,237	80.9	309,984	190,197	156,360	278,084
	7 mos.	1,944	8,338,704	1,245,627	10,737,085	1,037,321	1,940,673	464,298	4,541,332	555,802	8,610,891	80.2	2,126,194	1,300,316	1,203,419	1,925,805
Central New Jersey	July	692	2,367,425	722,784	3,284,254	329,549	558,892	67,174	1,340,147	114,564	2,431,560	74.0	852,694	306,389	217,021	639,983
	7 mos.	692	18,202,377	4,000,388	23,717,134	2,238,134	4,840,525	412,901	9,760,751	802,605	18,209,173	76.8	5,507,961	3,169,188	2,528,716	3,673,214
Central Vermont	July	456	415,073	76,601	554,873	101,582	89,380	18,952	233,858	23,005	468,783	84.5	86,090	68,401	75,065	122,365
	7 mos.	456	3,137,337	505,450	4,032,776	877,247	733,822	124,634	1,714,822	171,060	3,634,843	90.1	397,933	303,899	369,120	721,685
Chesapeake & Ohio	July	3,119	9,921,443	345,773	10,786,804	1,332,366	1,844,861	195,627	2,572,379	335,147	6,287,870	58.3	4,498,934	3,677,408	3,634,452	3,117,771
	7 mos.	3,119	63,777,468	2,568,424	69,796,505	9,307,181	13,355,500	1,202,471	17,877,786	2,382,031	44,231,626	63.4	25,564,879	19,583,041	19,564,963	21,449,475
Chicago & Eastern Illinois	July	938	1,051,413	142,339	1,304,159	160,255	245,341	70,939	566,861	65,224	1,118,218	85.7	185,941	70,727	—93,704	—79,529
	7 mos.	938	7,141,849	1,104,873	9,087,771	1,188,354	1,946,456	498,916	4,122,264	477,675	8,324,783	91.6	762,988	—54,765	—1,045,093	—525,701

* Formerly the Chicago & Alton.

Revenues and Expenses of Railways

MONTH OF JULY AND SEVEN MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Chicago & Illinois Midland	July	131	$208,442	$2,222	$219,967	$26,061	$38,222	$20,485	$61,840	$18,586	$165,058	75.0	$54,909	$45,568	$42,366	$56,861
	7 mos.	131	1,501,395	19,995	1,574,637	181,117	374,383	139,478	490,839	138,702	1,323,733	84.1	250,904	198,533	154,490	243,671
Chicago & North Western	July	8,458	7,098,759	1,505,995	9,592,983	1,616,388	1,806,457	230,686	3,605,162	365,277	7,667,345	79.9	1,925,638	1,198,941	1,048,813	1,486,374
	7 mos.	8,458	45,879,617	9,232,494	61,997,811	9,468,055	12,285,584	1,437,104	25,126,935	2,631,156	51,279,007	82.7	10,718,804	5,638,903	4,142,685	7,682,158
Chicago, Burlington & Quincy	July	9,306	7,578,285	1,217,794	9,714,653	1,453,388	1,531,367	264,740	3,244,972	348,185	6,917,512	71.2	2,797,141	1,940,516	1,696,423	2,218,182
	7 mos.	9,316	52,878,795	6,847,566	66,744,268	8,454,761	10,849,945	1,791,162	22,949,912	2,491,939	47,015,632	70.4	19,728,636	13,685,979	11,912,535	14,881,405
Chicago Great Western	July	1,495	1,659,083	126,332	1,904,463	347,881	206,477	83,436	658,022	62,042	1,362,649	71.2	541,814	453,494	275,684	190,989
	7 mos.	1,495	10,072,249	792,186	11,696,670	1,525,930	1,340,282	579,630	4,387,056	415,770	8,280,849	70.8	3,415,821	2,818,444	1,507,376	1,199,496
Chicago, Indianapolis & Louisville	July	647	745,687	73,072	907,161	104,282	185,261	36,030	381,521	32,466	746,297	82.3	160,864	95,245	—18,989	65,520
	7 mos.	647	5,416,062	678,219	6,779,358	678,204	1,404,874	246,177	2,744,713	237,587	5,376,160	79.3	1,403,198	955,854	174,401	699,527
Chic., Mil., St. Paul & Pacific	July	11,319	8,139,679	873,537	9,995,627	1,452,389	1,736,851	296,287	3,646,924	326,465	7,440,550	74.4	2,555,077	1,814,096	1,383,864	1,401,638
	7 mos.	11,322	54,611,603	5,508,441	66,807,751	10,899,289	13,616,857	1,999,525	26,064,181	2,370,906	54,951,740	82.3	11,856,011	6,446,262	3,669,838	6,361,045
Chicago River & Indiana	July	20	.....	.....	451,725	32,000	35,000	1,826	151,329	15,705	235,860	52.2	215,865	163,734	235,698	273,693
	7 mos.	20	.....	.....	3,228,023	282,000	265,000	13,104	1,108,365	129,653	1,798,122	55.7	1,429,901	1,116,762	1,632,627	1,779,139
Chicago, Rock Island & Pacific	July	7,593	8,582,301	836,212	10,170,758	1,057,490	1,558,301	248,856	3,205,258	332,220	6,496,462	63.9	3,674,296	3,143,656	2,596,584	2,221,817
	7 mos.	7,593	46,500,691	6,292,518	58,312,442	6,399,111	10,316,940	1,657,255	21,841,097	2,378,629	43,267,734	74.2	15,044,708	11,266,276	8,328,008	9,211,668
Chicago, Rock Island & Gulf	July	722	1,057,535	39,783	1,028,098	69,248	45,420	20,314	220,847	22,123	380,774	37.0	647,324	625,471	571,396	382,431
	7 mos.	653	3,261,638	306,595	3,723,029	449,883	282,874	145,163	1,160,006	156,549	2,216,978	59.6	1,506,051	1,340,420	1,113,583	1,005,827
Chic., St. Paul, Minn. & Omaha	July	1,736	1,254,237	238,198	1,641,028	256,000	287,380	39,410	723,407	81,342	1,397,363	85.2	243,665	144,117	58,201	172,108
	7 mos.	1,736	8,604,245	1,443,122	11,048,578	1,684,873	2,136,452	275,344	5,064,415	584,744	9,817,328	88.9	1,231,250	562,626	63,939	1,012,488
Clinchfield R. R.	July	309	410,244	5,783	423,736	56,283	107,911	18,474	92,205	17,551	292,399	69.0	131,337	66,337	82,268	125,903
	7 mos.	309	3,165,850	46,967	3,272,794	381,052	809,401	134,055	725,702	122,887	2,172,422	66.4	1,100,372	645,360	887,791	1,164,268
Colorado & Southern	July	1,037	486,427	68,854	623,481	112,289	110,425	19,923	223,100	38,040	507,595	81.4	115,886	47,285	27,312	49,588
	7 mos.	1,037	3,618,529	349,960	4,412,404	668,501	948,322	112,870	1,686,773	277,956	3,706,999	84.0	705,405	231,845	98,441	513,397
Ft. Worth & Denver City	July	693	1,136,671	86,395	1,373,047	71,239	98,829	20,813	254,886	39,317	487,505	35.5	885,542	853,754	799,921	469,801
	7 mos.	695	3,811,496	498,142	4,723,501	475,985	693,645	139,446	1,405,347	265,312	2,996,044	63.4	1,727,457	1,486,147	1,337,848	1,252,234
Wichita Valley	July	270	71,890	1,019	76,450	15,387	3,304	35	24,591	2,173	45,414	59.4	31,036	24,309	12,681	—32,648
	7 mos.	270	323,245	9,151	354,705	94,201	25,897	127	164,160	12,592	296,285	83.5	58,420	10,044	—62,886	—124,838
Columbus & Greenville	July	167	72,222	5,713	82,437	15,192	13,144	4,089	34,080	10,843	77,348	93.8	5,089	2,089	3,812	2,243
	7 mos.	167	545,280	43,728	624,544	102,743	93,230	27,491	249,081	80,058	552,589	88.5	71,955	54,743	61,805	83,168
Conemaugh & Black Lick	July	20	47,743	.....	73,078	6,273	11,979	472	37,416	3,461	59,601	81.6	13,477	12,577	16,570	17,440
	7 mos.	20	236,096	.....	463,110	61,634	125,666	3,686	307,154	24,258	522,398	112.8	—59,288	—65,588	—42,318	134,510
Delaware & Hudson	July	882	2,099,850	234,942	2,537,098	340,467	588,102	66,681	940,657	145,543	2,092,158	82.5	444,940	382,675	379,021	486,030
	7 mos.	882	15,804,738	1,198,315	18,270,756	2,793,794	4,598,208	402,320	6,990,694	1,069,060	15,903,899	87.0	2,366,857	1,786,044	1,861,977	2,825,330
Delaware, Lackawanna & Western	July	998	3,273,801	810,699	4,774,283	524,555	873,517	134,832	2,025,283	179,256	3,780,632	79.2	993,651	538,299	530,125	1,080,963
	7 mos.	998	25,541,524	5,131,512	35,441,485	3,508,037	6,675,615	968,278	15,015,530	1,237,584	27,687,570	78.1	7,753,915	4,547,970	4,468,984	6,106,222
Denver & Rio Grande Western	July	2,519	1,380,407	248,045	1,777,209	206,677	334,283	55,210	574,505	82,477	1,277,586	71.9	499,623	334,590	354,145	516,580
	7 mos.	2,547	10,854,639	1,025,441	12,846,106	1,565,602	2,884,505	384,536	4,107,911	602,493	9,652,318	75.1	3,193,788	2,037,458	2,166,793	3,172,675
Denver & Salt Lake	July	232	111,298	9,004	133,960	38,633	34,460	2,124	27,552	10,147	112,916	84.3	21,044	5,039	3,716	4,817
	7 mos.	232	892,006	61,904	1,046,631	218,594	255,754	13,456	208,084	75,342	771,230	73.7	275,401	163,384	205,612	333,766
Detroit & Mackinac	July	242	75,198	5,782	90,455	15,543	15,221	1,398	26,842	4,532	63,520	70.2	26,935	12,709	18,047	7,107
	7 mos.	242	512,679	34,344	606,583	113,337	111,500	9,846	192,011	30,740	454,685	75.0	151,898	117,356	110,837	—1,342
Detroit & Toledo Shore Line	July	50	187,663	.....	190,661	24,033	24,814	8,049	57,169	7,520	119,693	62.8	70,968	51,307	15,589	10,895
	7 mos.	50	1,797,252	.....	1,824,326	203,922	189,499	53,901	511,680	56,452	1,011,834	55.5	812,492	648,603	298,820	501,476
Detroit Terminal	July	19	.....	.....	56,259	7,404	7,809	30	33,112	3,959	52,314	93.0	3,945	—6,030	—16,342	—11,689
	7 mos.	19	.....	.....	601,095	62,052	63,140	36	321,110	28,431	474,769	79.0	126,326	38,531	—18,969	90,037
Detroit, Toledo & Ironton	July	487	408,509	1,120	430,166	42,621	75,026	12,883	162,138	26,735	315,256	73.3	114,910	67,570	61,586	51,370
	7 mos.	495	3,881,558	7,595	4,001,552	470,889	599,148	89,394	1,300,090	213,523	2,662,593	66.5	1,338,961	1,000,565	881,686	2,581,996
Duluth, Missabe & Northern	July	563	2,077,965	4,604	2,360,834	224,636	252,427	4,934	360,966	37,674	880,949	37.3	1,479,885	1,338,757	1,338,336	2,345,249
	7 mos.	564	5,043,800	24,942	5,782,297	1,536,341	2,059,887	29,152	1,697,661	274,402	5,597,181	96.8	185,116	—313,383	—314,876	3,659,795
Duluth, Winnipeg & Pacific	July	178	73,198	10,360	90,440	36,785	33,742	3,853	48,985	6,840	132,440	146.4	—42,000	—46,522	—54,021	—13,354
	7 mos.	178	629,482	48,304	724,972	199,046	247,590	30,559	383,456	50,470	920,781	127.0	—195,809	—232,209	—191,398	13,176
Elgin, Joliet & Eastern	July	447	870,687	2	954,581	174,705	245,480	15,717	441,427	54,185	931,516	97.6	23,065	—93,276	—133,475	202,477
	7 mos.	447	8,225,937	29	9,034,583	1,225,806	1,848,754	108,314	3,758,791	378,672	7,318,693	81.0	1,715,890	884,270	383,306	1,890,136
Erie Railroad	July	2,046	5,379,981	750,185	6,739,484	996,000	1,385,652	173,550	2,627,951	282,371	5,503,203	81.7	1,236,281	820,400	641,642	1,195,875
	7 mos.	2,046	38,969,150	4,635,908	47,737,623	5,909,999	10,322,997	1,159,411	18,456,412	1,979,392	38,050,493	79.7	9,687,130	6,956,967	6,356,331	7,251,574

Revenues and Expenses of Railways

MONTH OF JULY AND SEVEN MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Chicago & Erie	July	269	$753,888	$42,076	$847,350	$132,247	$128,274	$28,789	$275,459	$40,223	$604,680	71.4	$242,670	$186,589	—$53,323	$8,790
	7 mos.	269	5,752,063	269,046	6,483,316	795,540	814,709	204,654	1,959,992	291,056	4,062,853	62.7	2,420,463	2,028,012	315,099	851,867
New Jersey & New York	July	45	25,588	87,978	117,326	12,965	27,894	1,471	57,309	3,642	103,281	88.0	14,045	9,644	—13,252	—18,527
	7 mos.	45	169,599	592,693	787,971	77,999	152,169	9,756	395,618	24,969	660,500	83.8	127,471	96,705	—100,697	—153,075
N. Y., Susquehanna & Western	July	131	250,397	37,120	311,628	53,201	50,380	5,305	132,755	13,025	254,664	81.7	56,964	23,806	4,439	61,001
	7 mos.	131	2,195,578	243,364	2,650,068	293,616	347,072	33,676	1,062,115	89,935	1,826,264	68.9	823,804	594,069	401,257	326,260
Florida East Coast	July	864	255,171	92,579	407,784	110,076	121,733	23,721	171,005	45,100	478,024	117.2	—70,240	—187,114	—235,050	—300,020
	7 mos.	864	3,855,155	2,007,012	6,734,893	856,317	1,063,554	207,567	1,895,223	323,043	4,458,796	66.2	2,276,097	1,461,465	1,006,969	1,244,617
Fort Smith & Western	July	249	45,895	2,146	52,546	14,812	15,639	4,436	25,489	5,110	65,352	124.4	—12,806	—16,406	—24,702	—691
	7 mos.	249	392,332	22,015	453,215	94,436	95,561	33,616	200,941	38,698	458,854	101.2	—5,639	—30,896	—93,077	—14,554
Galveston Wharf	July	13	.....	.....	192,334	35,743	4,389	3,296	34,885	6,293	106,950	55.6	85,384	62,384	64,013	75,085
	7 mos.	13	.....	.....	965,858	245,422	33,946	27,360	197,816	58,454	664,531	68.8	301,327	140,092	141,892	97,820
Georgia R. R.	July	328	313,716	30,066	368,189	40,027	62,531	22,619	159,647	22,848	308,246	83.7	59,943	52,281	58,823	65,338
	7 mos.	328	2,094,719	208,335	2,499,096	256,341	465,707	149,044	1,112,792	162,197	2,148,926	86.0	350,170	295,455	369,579	390,311
Georgia & Florida	July	463	116,708	3,012	125,015	27,647	21,157	9,918	49,022	7,519	115,477	92.4	9,538	2,038	—5,327	3,490
	7 mos.	463	784,387	23,751	853,019	208,902	147,424	72,982	348,493	53,860	832,822	97.6	20,197	—32,305	—64,074	—37,032
Grand Trunk Western	July	1,021	1,427,323	148,050	1,703,261	276,434	351,919	56,557	773,309	108,043	1,568,055	92.1	135,206	18,210	—106,429	—206,973
	7 mos.	1,020	11,119,275	802,504	12,863,557	1,914,153	2,599,196	447,849	5,670,194	735,058	11,405,263	88.7	1,458,294	628,828	—565,427	839,337
Canadian Nat'l in New Eng.	July	172	75,473	19,022	108,167	38,134	38,932	4,515	70,721	9,455	162,857	150.6	—54,690	—68,000	—111,624	—149,390
	7 mos.	172	652,139	103,327	860,565	202,875	256,131	36,895	573,214	61,163	1,150,849	133.7	—290,284	—392,889	—712,520	—657,588
Great Northern	July	8,346	5,560,376	656,984	6,990,782	997,333	1,274,378	198,209	2,164,687	227,332	4,905,609	70.2	2,085,173	1,444,203	1,272,821	1,931,197
	7 mos.	8,367	35,299,787	3,653,067	43,404,200	6,366,777	9,289,151	1,598,428	15,165,443	1,612,486	34,379,386	79.2	9,024,814	4,342,717	3,442,982	5,243,394
Green Bay & Western	July	234	115,915	1,606	120,284	23,541	13,019	6,081	48,668	2,713	94,003	78.1	26,281	20,281	17,480	11,026
	7 mos.	234	801,886	11,610	835,184	151,845	162,155	40,316	348,642	21,256	723,936	86.7	111,248	59,248	44,579	162,649
Gulf & Ship Island	July	307	107,508	16,871	144,259	31,696	17,809	4,363	67,324	6,274	128,633	89.2	15,626	—14,569	—26,338	—61,821
	7 mos.	307	752,193	128,269	1,041,763	273,833	187,317	30,703	536,427	47,404	1,083,785	104.0	—42,022	—252,232	—344,792	—55,555
Gulf, Mobile & Northern	July	733	303,052	11,285	331,889	50,052	63,208	20,996	121,900	18,119	274,290	82.65	57,599	30,491	12,904	2,606
	7 mos.	733	2,276,869	83,681	2,483,662	395,186	442,816	180,712	932,875	151,483	2,103,897	84.71	379,765	189,759	13,551	320,605
Illinois Central	July	5,018	6,775,674	933,687	8,256,225	986,811	1,604,539	234,294	3,266,327	360,978	6,512,506	78.9	1,743,719	1,247,004	1,198,153	1,414,677
	7 mos.	5,018	47,216,171	7,761,962	60,562,736	7,299,909	13,850,197	1,698,785	24,117,798	2,556,911	49,979,959	82.5	10,582,777	6,289,127	5,415,800	10,192,949
Yazoo & Mississippi Valley	July	1,681	1,146,497	134,340	1,356,348	228,106	233,960	40,270	583,561	67,579	1,155,530	85.2	200,818	35,717	—81,537	—97,662
	7 mos.	1,683	8,312,272	919,496	9,882,822	1,704,303	1,880,037	290,965	4,365,683	474,926	8,734,871	88.4	1,147,951	—24,537	—906,415	1,146,059
Illinois Central System	July	6,700	7,922,171	1,068,027	9,612,573	1,214,917	1,838,499	274,564	3,849,888	428,557	7,668,036	79.8	1,944,537	1,282,721	1,116,616	1,317,015
	7 mos.	6,702	55,528,443	8,681,458	70,445,558	9,004,212	15,730,234	1,989,750	28,483,481	3,031,837	58,714,830	83.3	1,730,728	6,264,590	4,509,385	11,342,452
Illinois Terminal	July	552	448,783	77,097	550,906	71,118	62,924	24,309	175,317	31,984	363,241	65.94	187,665	155,165	123,420	87,602
	7 mos.	557	3,057,432	603,497	3,838,305	436,082	485,738	139,104	1,235,864	256,747	2,545,115	66.31	1,293,190	1,075,768	883,369	780,146
Kansas City Southern	July	784	830,133	46,473	1,016,557	104,259	182,257	47,328	325,331	66,186	728,994	71.7	287,563	186,097	138,448	407,752
	7 mos.	784	6,321,740	316,857	7,518,774	698,527	1,282,468	374,106	2,344,401	481,793	5,174,514	68.8	2,344,260	1,670,389	1,423,605	1,980,351
Texarkana & Ft. Smith	July	99	148,216	2,830	188,372	18,145	5,343	6,988	43,551	10,109	85,715	45.5	102,657	93,927	66,150	68,981
	7 mos.	99	1,005,828	21,164	1,166,025	111,831	82,796	51,583	321,658	70,520	652,384	55.9	513,641	453,023	282,184	282,432
Kansas, Oklahoma & Gulf	July	326	238,150	917	243,015	35,267	33,132	12,847	55,655	10,933	146,892	60.4	96,123	76,351	54,487	45,417
	7 mos.	326	1,494,709	8,130	1,533,456	179,711	180,803	97,446	366,934	81,017	900,617	58.7	632,839	503,421	367,781	494,267
Lake Superior & Ishpeming	July	160	188,297	162	220,691	26,870	22,810	666	37,796	8,598	96,729	43.8	123,962	105,630	104,507	169,458
	7 mos.	160	619,687	3,520	713,348	159,486	178,213	4,261	218,364	54,323	614,636	86.2	98,712	—21,403	—32,549	274,339
Lake Terminal	July	12	.....	.....	60,386	3,740	4,321	.....	25,815	2,010	35,886	59.4	24,500	20,372	23,251	39,233
	7 mos.	12	.....	.....	384,309	56,725	63,498	.....	208,740	14,379	343,342	89.3	40,967	11,935	6,263	21,511
Lehigh & Hudson River	July	96	164,938	880	173,598	15,893	38,313	3,581	61,332	9,085	128,204	73.9	45,394	32,204	15,237	27,650
	7 mos.	96	1,117,954	5,109	1,183,283	138,596	196,142	26,392	420,974	66,244	848,348	71.7	334,935	239,412	120,283	141,179
Lehigh & New England	July	216	311,493	874	315,753	41,948	78,503	4,874	117,535	17,584	260,444	82.5	55,309	46,284	53,146	76,826
	7 mos.	216	2,422,285	5,656	2,451,031	335,188	550,839	36,458	878,754	153,027	1,954,192	79.7	496,839	416,444	481,781	531,704
Lehigh Valley	July	1,361	3,155,878	385,595	3,873,937	458,422	908,652	138,667	1,729,452	133,501	3,394,106	87.6	479,831	184,618	77,281	802,107
	7 mos.	1,361	25,619,979	2,540,203	30,664,425	2,898,934	7,029,075	926,143	12,979,883	942,326	24,936,676	81.3	5,727,749	3,680,776	2,930,502	4,507,679
Louisiana & Arkansas	July	608	506,935	14,008	551,428	58,248	59,453	20,692	127,649	21,779	288,423	52.3	263,005	208,927	188,723	164,708
	7 mos.	608	3,015,075	92,979	3,299,005	481,193	437,571	145,572	910,557	161,053	2,137,845	64.8	1,161,160	830,303	710,498	694,190
Louisiana, Arkansas & Texas	July	202	50,295	1,278	54,756	20,158	7,972	3,837	21,780	4,567	58,314	106.5	—3,558	—6,058	—11,763	—10,544
	7 mos.	202	397,703	8,310	425,561	124,092	61,769	24,282	176,972	32,107	419,122	98.5	6,439	—20,037	—68,004	—157,244

Revenues and Expenses of Railways

MONTH OF JULY AND SEVEN MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Louisville & Nashville	July	5,264	$5,987,783	$670,908	$7,140,116	$1,094,358	$1,575,603	$205,228	$2,729,980	$361,107	$5,975,245	83.7	$1,164,871	$675,956	$766,067	$812,127
	7 mos.	5,267	44,567,480	5,096,256	53,443,610	7,975,533	11,752,060	1,622,325	20,110,882	2,674,993	44,401,501	83.1	9,042,109	5,625,894	5,582,745	6,370,747
Maine Central	July	1,121	887,564	230,812	1,249,007	222,709	177,462	23,751	494,256	45,864	968,676	77.6	280,331	190,313	168,813	181,331
	7 mos.	1,121	7,003,557	1,269,425	9,134,989	1,433,607	1,542,880	133,174	3,593,972	324,237	7,039,147	77.1	2,095,842	1,513,847	1,155,105	1,721,026
Midland Valley	July	363	174,832	2,253	182,635	30,628	10,867	4,917	45,509	8,785	100,154	54.8	82,481	70,309	58,996	75,036
	7 mos.	363	1,130,785	19,410	1,193,974	210,348	139,891	36,073	330,319	75,368	788,440	66.0	405,534	316,601	241,099	467,159
Minneapolis & St. Louis	July	1,627	975,817	31,125	1,062,882	149,954	183,013	36,496	438,476	45,692	853,899	80.3	208,983	151,561	121,742	46,841
	7 mos.	1,627	5,617,146	225,391	6,238,920	817,403	1,247,998	259,591	2,913,277	345,669	5,581,175	89.5	657,745	291,164	102,407	—50,179
Minn., St. Paul & S. S. Marie	July	4,379	2,065,480	300,596	2,640,610	355,242	437,226	83,013	1,040,778	118,941	2,060,131	78.0	580,479	366,558	228,445	385,719
	7 mos.	4,379	14,398,777	1,330,503	17,279,750	2,518,298	3,548,266	533,358	7,220,649	856,750	14,760,268	85.4	2,519,482	1,047,036	103,794	891,974
Duluth, South Shore & Atlantic	July	560	176,321	21,733	227,282	74,164	41,954	8,061	102,234	10,492	238,650	105.0	—11,368	—40,368	—45,863	—1,906
	7 mos.	560	1,362,010	154,355	1,688,602	362,018	321,595	54,682	774,108	69,183	1,593,546	94.4	95,056	—114,978	—154,376	36,715
Spokane International	July	163	64,518	3,625	73,040	21,106	6,147	3,370	24,587	5,367	61,280	83.9	11,760	6,692	2,721	10,972
	7 mos.	163	402,709	25,190	462,654	101,189	45,152	23,426	175,464	39,583	389,207	84.1	73,447	38,092	11,116	18,899
Mississippi Central	July	150	94,611	2,575	99,258	13,016	11,298	8,409	26,394	6,084	65,201	65.7	34,057	28,546	22,635	10,372
	7 mos.	150	556,233	16,067	591,019	98,808	88,635	61,210	180,038	45,829	474,492	80.3	116,527	77,160	50,060	102,171
Missouri & North Arkansas	July	364	75,280	2,382	83,141	19,013	13,582	9,361	34,766	8,088	84,702	101.9	—1,561	—3,972	—13,935	—12,112
	7 mos.	364	660,301	16,646	720,104	159,927	101,541	65,620	291,536	56,666	674,320	93.6	45,784	27,772	—47,050	40,129
Missouri-Illinois	July	202	122,603	927	125,646	20,013	27,740	3,418	33,924	6,117	91,212	72.6	34,434	27,889	19,991	27,361
	7 mos.	202	755,260	6,725	779,325	125,105	170,408	24,360	244,056	43,403	605,986	77.8	173,339	131,479	75,753	175,632
Missouri-Kansas-Texas Lines	July	3,293	2,663,302	284,058	3,229,657	413,288	518,928	135,673	1,010,098	156,083	2,249,637	69.7	980,020	767,965	519,669	1,158,465
	7 mos.	3,203	15,658,029	2,119,128	19,810,558	2,525,302	3,632,947	895,794	7,004,386	1,133,606	15,316,080	77.3	4,494,478	3,057,293	1,614,247	4,109,676
Missouri Pacific	July	7,444	7,698,310	656,789	9,068,925	1,242,955	1,580,157	292,702	3,060,804	334,238	6,516,294	71.9	2,552,631	2,114,770	1,665,105	1,962,782
	7 mos.	7,448	48,341,657	4,496,531	58,016,644	6,942,562	9,778,893	1,946,083	21,012,164	2,406,891	42,178,825	72.7	15,837,819	12,887,072	10,278,572	11,284,482
Gulf Coast Lines	July	1,037	566,907	64,232	676,551	118,903	151,886	42,887	204,066	59,259	579,576	85.67	96,975	47,861	32,982	222,281
	7 mos.	1,037	6,493,401	524,702	7,453,426	1,049,387	1,231,968	311,144	2,058,528	424,615	5,075,793	68.10	2,377,633	2,033,075	1,380,295	2,360,410
International Great Northern	July	1,159	1,661,458	114,182	1,869,236	219,029	283,870	36,869	620,933	64,244	1,245,081	66.61	624,155	580,900	386,378	32,744
	7 mos.	1,159	10,249,614	779,301	11,788,705	1,555,758	1,798,958	267,047	4,431,754	461,737	8,477,341	71.91	3,311,364	3,017,396	1,775,996	92,054
San Antonio, Uvalde & Gulf	July	316	85,449	9,130	101,454	26,751	14,194	5,291	21,975	6,273	74,766	73.7	25,688	21,962	—3,812	—8,765
	7 mos.	316	770,505	72,711	909,474	248,682	121,966	38,306	213,607	46,016	667,078	73.3	242,396	209,644	14,335	96,571
Mobile & Ohio	July	1,152	724,342	40,938	824,100	129,830	154,710	48,028	353,848	45,188	730,140	88.6	93,960	33,511	—17,982	86,591
	7 mos.	1,152	5,691,000	258,268	6,338,038	883,117	1,211,253	360,273	2,634,580	347,540	5,426,438	85.6	911,600	450,719	20,318	613,093
Monongahela	July	177	422,416	2,431	427,640	60,000	45,000	1,352	93,735	9,932	210,019	49.1	217,621	198,240	121,490	112,275
	7 mos.	177	2,854,161	20,293	2,895,552	420,000	315,000	9,168	692,076	72,480	1,508,267	52.1	1,387,285	1,284,754	728,878	776,738
Monongahela Connecting	July	6	.....	.....	80,530	10,722	22,724	250	47,190	2,570	83,461	103.6	—2,931	—7,991	—8,890	24,440
	7 mos.	6	.....	.....	688,718	95,154	176,559	2,024	358,115	19,932	651,784	94.6	36,934	—355	369	175,972
Montour	July	57	223,896	.....	225,977	26,832	42,965	1,506	46,693	7,383	125,310	55.5	100,667	98,599	116,999	81,163
	7 mos.	57	1,212,797	.....	1,219,925	133,611	289,771	9,839	329,154	52,244	814,496	66.8	405,429	390,948	506,069	536,603
Nash., Chatt. & St. Louis	July	1,203	1,077,841	127,087	1,307,439	244,756	272,452	67,677	531,735	75,945	1,197,503	91.6	109,936	61,220	45,629	267,312
	7 mos.	1,203	7,705,935	913,819	9,488,186	1,656,964	1,959,795	498,954	3,730,718	546,015	8,433,791	88.9	1,054,395	655,741	533,720	1,346,201
Nevada Northern	July	165	33,986	978	40,143	11,287	5,416	1,132	9,522	4,356	31,713	79.0	8,430	—254,966	—252,117	13,748
	7 mos.	165	259,029	12,691	307,759	79,635	33,457	7,033	81,889	32,955	234,916	76.3	72,843	—236,899	—220,875	140,445
Newburgh & South Shore	July	6	.....	.....	70,749	8,656	19,937	.....	34,896	6,766	70,255	99.3	494	1,110	2,884	—774
	7 mos.	6	.....	.....	645,727	132,081	167,992	.....	300,451	48,317	648,841	100.5	—3,114	—80,566	—60,944	186,192
New Orleans Great Northern	July	264	199,897	13,931	220,952	15,810	26,870	16,845	62,164	10,508	132,197	59.8	88,755	78,425	53,921	39,801
	7 mos.	264	1,257,022	73,128	1,370,686	128,484	190,382	101,402	403,595	74,406	898,269	65.5	472,417	399,850	253,592	168,518
New Orleans Terminal	July	20	1,366	.....	169,288	19,186	6,830	.....	46,311	1,762	74,089	43.8	95,199	83,241	57,368	25,167
	7 mos.	20	14,184	.....	960,981	123,585	64,545	.....	339,294	11,289	538,713	56.1	422,268	338,560	195,727	273,599
New York Central	July	11,421	20,269,797	7,650,973	32,811,339	4,479,330	6,770,938	795,086	12,282,534	1,309,940	26,155,599	79.7	6,655,740	3,949,437	2,717,058	4,481,337
	7 mos.	11,421	149,024,614	53,144,868	232,381,261	28,651,064	49,836,066	5,223,045	87,823,863	9,446,804	184,653,239	79.5	47,728,022	28,303,169	19,490,275	36,641,614
Indiana Harbor Belt	July	118	.....	.....	750,729	70,000	85,000	4,458	300,041	32,255	504,567	67.2	246,162	201,202	120,446	231,912
	7 mos.	118	.....	.....	5,493,065	490,000	645,000	32,468	2,485,523	199,619	3,971,347	72.3	1,521,718	1,213,890	917,754	1,469,301
Pittsburgh & Lake Erie	July	235	1,391,303	95,631	1,529,926	155,256	482,834	40,515	591,899	76,078	1,348,965	88.2	180,961	82,982	258,122	804,420
	7 mos.	234	9,988,611	756,840	11,076,714	1,043,858	3,334,488	236,560	4,326,001	547,149	9,513,130	85.9	1,563,584	815,140	2,115,824	4,342,462
New York, Chicago & St. Louis	July	1,698	2,820,675	158,792	3,093,767	479,980	494,710	123,193	1,156,341	125,479	2,389,564	77.2	704,203	485,800	191,625	339,240
	7 mos.	1,698	20,647,173	893,961	22,353,680	2,819,291	3,885,763	864,761	8,446,307	894,585	16,942,938	75.8	5,410,742	3,834,522	1,884,694	3,575,059

Revenues and Expenses of Railways

MONTH OF JULY AND SEVEN MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
N. Y., New Haven & Hartford	July	2,096	$4,582,973	$2,902,587	$8,343,497	$1,460,580	$1,198,474	$106,967	$2,892,392	$300,009	$6,107,449	73.2	$2,236,048	$1,835,291	$1,244,357	$1,740,375
	7 mos.	2,112	32,436,722	20,831,132	60,137,353	8,110,500	8,982,104	690,052	20,375,286	2,094,045	41,382,282	68.8	18,755,071	15,198,301	10,973,364	13,643,056
New York Connecting	July	20	167,792	.....	181,926	44,813	11,134	.....	40,230	1,290	97,467	53.6	84,459	48,659	18,462	53,832
	7 mos.	20	1,174,013	.....	1,307,980	146,923	52,084	.....	254,154	7,900	461,061	35.2	846,919	591,319	393,153	577,574
New York, Ontario & Western	July	568	745,186	345,930	1,250,438	179,845	179,116	15,507	391,372	25,570	794,683	63.6	455,755	413,214	341,179	282,667
	7 mos.	568	4,981,177	639,919	6,630,182	766,331	1,139,483	105,273	2,572,314	197,174	4,805,917	72.5	1,824,265	1,526,439	1,061,151	3,770,755
Norfolk & Western	July	2,282	6,657,120	237,108	7,128,619	819,210	1,308,863	126,804	1,798,611	255,649	4,315,378	60.5	2,813,241	2,161,651	2,343,377	3,119,240
	7 mos.	2,245	43,024,901	1,625,262	46,403,012	5,655,494	9,269,496	868,662	12,361,726	1,822,369	30,033,749	64.7	16,369,263	11,541,031	12,431,062	19,016,311
Norfolk Southern	July	932	473,899	24,090	521,925	85,566	78,117	26,784	214,259	25,321	429,984	82.4	91,941	42,968	27,006	52,212
	7 mos.	932	3,469,557	113,025	3,762,466	559,110	581,502	179,541	1,515,773	175,426	3,010,157	80.0	752,309	410,367	277,520	400,394
Northern Pacific	July	6,789	4,224,909	601,170	5,386,463	699,901	1,308,215	209,332	2,046,858	241,696	4,613,822	85.7	772,641	100,000	382,531	1,162,358
	7 mos.	6,789	29,212,006	3,436,846	36,234,491	5,470,034	8,877,513	1,482,000	14,020,982	1,798,764	32,220,012	88.9	4,014,479	—584,023	1,517,300	4,167,706
Northwestern Pacific	July	441	288,596	148,551	479,098	56,871	57,642	4,151	188,421	17,954	323,595	67.5	155,503	124,574	110,013	195,195
	7 mos.	441	1,336,337	810,547	2,395,323	577,553	456,413	42,665	1,244,956	119,318	2,437,366	101.8	—42,043	—289,261	—361,517	—75,023
Oklahoma City-Ada-Atoka	July	132	70,530	1,290	73,768	17,159	4,628	1,437	19,921	2,832	45,482	61.7	28,286	23,145	8,251	—3,797
	7 mos.	132	401,680	10,520	428,269	107,390	25,849	8,810	122,970	21,258	284,892	66.5	143,377	108,237	23,349	—36,362
Pennsylvania	July	10,914	27,531,459	7,059,229	38,285,176	4,525,944	7,898,998	751,795	14,713,346	1,565,146	29,986,253	78.3	8,298,923	5,229,196	4,115,871	9,046,611
	7 mos.	10,914	191,588,140	53,767,245	272,435,237	324,079	58,265,167	5,575,368	106,160,320	11,190,257	219,383,045	80.5	53,052,192	34,752,430	26,755,218	55,681,210
Long Island	July	404	729,809	2,745,350	3,629,561	294,706	456,181	26,936	1,272,355	62,342	2,113,422	58.2	1,516,139	1,034,775	788,315	1,164,812
	7 mos.	404	5,684,460	14,641,373	21,399,587	1,989,869	3,266,655	126,837	8,523,730	435,658	14,343,438	67.0	7,056,149	5,314,545	4,087,426	4,230,001
Peoria & Pekin Union	July	17	9,072	352	83,762	12,028	8,834	4,712	44,167	7,770	77,511	92.5	6,251	—8,032	12,524	34,082
	7 mos.	17	60,788	3,352	668,017	87,992	82,261	34,943	338,899	53,406	597,501	89.4	70,516	—38,767	135,833	190,281
Pere Marquette	July	2,264	1,906,281	181,525	2,233,558	436,547	465,015	73,703	912,959	110,587	2,007,562	89.9	225,996	72,627	—25,736	536,388
	7 mos.	2,265	14,539,226	928,849	16,471,175	2,742,112	3,288,412	495,675	6,636,874	752,558	13,970,152	84.8	2,501,023	1,428,885	785,919	2,650,898
Pittsburgh & Shawmut	July	102	86,355	348	87,461	12,687	22,097	1,160	20,918	2,118	58,980	67.4	28,481	27,326	29,341	29,809
	7 mos.	102	543,296	9,051	557,661	87,569	148,971	10,685	149,632	27,598	424,455	76.1	133,206	123,741	129,826	202,457
Pittsburgh & West Virginia	July	138	256,839	1,835	279,061	5,074	70,339	18,631	59,843	16,197	178,915	64.1	100,146	70,556	92,598	153,984
	7 mos.	105	1,584,503	14,784	1,771,020	193,140	466,532	137,061	380,449	126,646	1,367,223	77.2	403,797	222,076	405,512	984,583
Pittsburgh, Shawmut & Northern	July	198	113,561	403	115,613	25,176	19,715	1,437	40,065	6,302	92,695	80.2	22,918	20,147	15,121	—11,055
	7 mos.	198	748,259	2,625	765,842	134,479	139,851	10,327	266,078	47,423	598,158	78.1	167,684	147,915	122,024	87,118
Quincy, Omaha & Kansas City	July	249	58,726	3,012	66,422	31,390	8,750	820	20,037	1,931	62,858	94.6	3,564	—1,189	—3,814	—1,892
	7 mos.	249	223,395	23,864	283,604	124,759	40,341	6,224	137,537	15,938	324,190	114.3	—40,586	—73,879	—90,685	—78,763
Reading	July	1,459	4,706,681	358,374	5,381,905	942,459	1,433,560	92,288	2,310,910	213,891	5,015,382	93.2	366,523	145,330	136,335	574,500
	7 mos.	1,455	36,900,126	2,796,645	42,484,267	6,643,473	11,296,334	652,968	17,531,046	1,566,456	37,840,410	89.1	4,643,857	3,090,230	2,896,411	6,345,008
Atlantic City	July	163	92,732	305,334	420,509	27,096	27,984	6,731	206,001	4,117	271,985	64.7	148,524	108,075	94,356	64,524
	7 mos.	163	736,377	746,539	1,580,782	357,881	145,582	31,744	1,104,850	34,768	1,676,058	106.0	—95,276	—379,455	—449,801	—535,348
Richmond, Fredericksburg & Potomac	July	117	452,881	141,812	700,005	106,076	142,789	9,030	274,262	38,808	583,058	83.3	116,947	81,579	28,397	82,819
	7 mos.	117	3,330,224	1,629,142	6,039,556	524,824	1,048,536	65,655	2,121,947	260,002	4,157,215	68.8	1,882,341	1,529,991	1,065,225	921,122
Rutland	July	413	217,973	60,430	378,421	86,996	66,101	11,604	162,255	15,385	344,245	91.0	34,176	13,168	18,097	47,086
	7 mos.	413	1,590,427	411,302	2,631,882	537,376	526,912	78,699	1,154,601	120,455	2,418,151	91.9	213,731	67,419	98,825	309,059
St. Louis-San Francisco	July	5,266	3,826,898	447,011	4,644,860	490,183	838,113	124,470	1,698,853	196,288	3,377,130	72.71	1,267,730	963,474	932,089	1,574,757
	7 mos.	5,266	26,918,999	3,366,935	33,177,905	3,540,898	5,957,577	830,103	12,038,259	1,426,585	24,039,703	72.46	9,138,202	6,707,819	6,365,371	9,202,997
Ft. Worth & Rio Grande	July	233	52,426	3,419	63,720	19,904	12,964	3,189	33,635	4,526	74,181	116.4	—10,461	—14,886	—21,867	—26,538
	7 mos.	233	339,591	26,326	415,286	130,959	95,751	22,721	244,710	31,076	524,835	126.4	—109,549	—141,583	—206,297	—171,553
St. Louis, San Francisco & Texas	July	262	158,173	6,097	169,260	20,081	20,181	5,588	52,246	7,322	105,609	62.4	63,651	59,516	27,614	29,483
	7 mos.	262	726,671	47,669	811,352	162,057	132,000	40,178	358,252	53,014	746,193	92.0	65,159	35,895	—183,624	—112,828
St. Louis Southwestern Lines	July	1,913	1,437,785	33,703	1,556,274	140,603	210,658	86,631	459,829	79,094	983,915	63.2	572,359	480,200	252,067	163,057
	7 mos.	1,913	9,949,094	290,807	10,925,861	1,304,288	1,602,156	691,409	3,762,627	584,164	7,984,769	73.1	2,941,092	2,315,997	1,210,180	1,486,206
San Diego & Arizona	July	155	62,685	12,228	75,969	13,697	14,384	3,866	23,820	6,689	63,454	83.5	12,515	8,060	10,112	16,749
	7 mos.	155	431,732	100,335	544,977	99,475	101,813	24,473	160,287	49,759	443,484	81.4	101,493	63,553	75,283	170,494
Seaboard Air Line	July	4,478	2,497,739	271,723	3,051,175	451,960	719,418	171,624	1,258,323	175,267	2,776,647	91.0	274,528	71,941	79,691	190,460
	7 mos.	4,480	22,100,178	2,946,172	27,671,247	4,512,974	5,119,887	1,261,574	10,011,209	1,239,242	22,423,073	81.0	5,248,174	3,037,214	2,363,505	3,858,202
Southern Ry.	July	6,730	6,498,415	1,062,204	8,185,701	1,266,873	1,645,267	205,335	3,087,050	345,127	6,605,416	80.7	1,580,285	948,655	739,494	2,001,970
	7 mos.	6,730	46,978,229	7,716,572	59,483,004	9,238,823	12,470,896	1,556,049	22,628,055	2,410,512	48,739,578	81.9	10,743,426	6,186,427	4,699,669	9,933,644
Alabama Great Southern	July	315	408,050	70,630	518,643	102,597	125,526	15,418	186,341	21,135	455,249	87.8	63,394	21,188	39,715	41,800
	7 mos.	315	2,983,789	487,863	3,748,039	757,499	919,983	113,815	1,360,576	155,144	3,337,867	89.1	410,172	109,396	197,227	672,266

Continued on Next Left Hand Page

Unprofitable Power...

OFFICIALS OF an important railroad owning 1500 locomotives have recommended sixteen per cent of the total for retirement on account of being uneconomical in operation.

Plainly, neither the number of obsolete and stored locomotives, nor their aggregate tractive effort, afford an accurate measure of the ability of the railroads to meet economically an emergency demand for power.

Most locomotives now held in white lead and reported as "stored, serviceable" will seriously handicap operation if ever returned to service.

As a profit maker, not a single locomotive in this country over five years old can begin to hold its own with the really up-to-date power plant on wheels known as the Super-power locomotive.

LIMA LOCOMOTIVE WORKS INCORPORATED

LIMA LOCOMOTIVE WORKS

Incorporated

LIMA **OHIO**

Revenues and Expenses of Railways

MONTH OF JULY AND SEVEN MONTHS OF CALENDAR YEAR 1931—CONTINUED

Name of road		Av. mileage operated during period.	Operating revenues: Freight.	Passenger.	Total (inc. misc.)	Operating expenses: Maintenance of Way and structures.	Maintenance of Equipment.	Traffic.	Transportation.	General.	Total.	Operating ratio.	Net from railway operation.	Operating income (or loss).	Net ry. operating income.	Net ry. operating income, 1930.
Cinn., New Orleans & Tex. Pac.	July	338	$1,117,285	$103,106	$1,311,866	$215,593	$295,947	$31,662	$369,000	$56,430	$973,856	74.2	$338,010	$255,967	$251,414	$333,058
	7 mos.	338	7,590,959	899,825	9,062,597	1,658,604	2,222,553	245,085	2,796,749	380,246	7,352,654	81.1	1,709,943	1,186,490	1,159,925	2,003,365
Georgia Southern & Florida	July	397	208,956	30,646	256,613	56,389	58,259	1,605	88,537	2,966	210,496	82.0	46,117	24,235	25,875	56,014
	7 mos.	397	1,386,733	360,393	1,896,762	395,502	438,149	15,187	676,829	19,592	1,578,766	83.2	317,996	177,091	149,781	210,596
New Orleans & Northeastern	July	204	194,352	34,526	245,871	47,962	55,808	9,355	99,620	13,778	228,723	93.0	17,148	—21,290	—38,156	4,149
	7 mos.	204	1,491,639	243,480	1,874,915	353,990	450,332	66,281	134,620	98,652	1,720,932	91.8	153,983	—121,575	—275,810	150,381
Northern Alabama	July	110	47,480	1,314	50,710	12,869	2,572	1,544	19,404	2,574	38,963	76.8	11,747	6,225	—10,062	—3,606
	7 mos.	110	380,741	14,585	410,415	113,506	18,136	12,411	158,037	19,542	321,632	78.4	88,783	50,068	—50,898	32,260
Southern Pacific	July	9,114	9,875,715	2,471,046	13,470,261	1,457,084	1,915,712	319,933	4,607,406	597,120	9,177,214	68.1	4,293,047	3,132,474	2,453,301	3,559,463
	7 mos.	9,124	64,844,365	16,982,260	89,885,021	10,965,597	15,403,174	2,555,848	31,784,239	4,263,132	66,683,631	74.2	23,201,390	15,036,516	11,909,494	17,527,065
So. Pacific S. S. Lines	July	....	485,141	56,664	581,371	22,391	142,078	20,690	439,561	30,521	655,241	112.7	—73,870	—75,222	—75,039	—32,850
	7 mos.	....	3,248,169	300,444	3,797,446	143,482	1,038,461	144,409	2,846,669	224,458	4,397,509	115.8	—600,063	—610,550	—611,159	—377,494
Texas & New Orleans	July	4,700	3,322,829	506,352	4,233,237	614,103	713,122	148,099	1,375,879	233,085	3,097,377	73.2	1,135,860	850,988	574,341	688,282
	7 mos.	4,700	21,550,848	3,517,281	27,960,866	4,547,115	5,418,938	1,138,087	10,205,342	1,647,271	23,045,725	82.4	4,915,141	3,096,660	1,260,737	2,914,738
Spokane, Portland & Seattle	July	555	425,822	70,226	547,597	70,470	87,339	12,869	164,507	23,524	359,959	65.7	187,638	99,377	88,635	105,528
	7 mos.	555	2,905,483	380,214	3,616,916	399,367	550,828	82,628	1,189,016	160,134	2,395,452	66.2	1,221,464	615,097	569,943	626,178
Tennessee Central	July	295	203,839	7,124	219,732	38,776	36,138	7,738	81,958	13,215	177,590	80.8	42,124	36,681	20,252	53,741
	7 mos.	295	1,456,315	56,795	1,587,017	312,378	263,793	60,028	587,189	96,267	1,317,062	83.0	269,955	230,828	120,905	193,661
Tenn. R. R. Assn. of St. L.	July	55	.....	.....	658,138	89,179	64,248	4,264	314,323	20,997	495,981	75.4	162,157	66,605	141,053	185,881
	7 mos.	55	.....	.....	4,839,849	665,268	472,271	26,795	2,352,505	159,567	3,697,405	76.4	1,142,444	492,112	1,033,282	1,405,259
Texas & Pacific	July	1,950	2,261,141	282,303	2,751,854	336,637	430,748	73,295	818,113	115,952	1,792,604	65.1	959,250	813,926	539,947	663,825
	7 mos.	1,952	15,103,988	2,045,624	18,653,866	2,214,757	2,987,647	560,688	5,883,361	815,364	12,576,973	67.4	6,076,893	5,066,944	3,618,365	4,103,209
Texas Mexican	July	162	59,111	1,822	65,110	11,989	15,583	3,103	29,430	6,273	66,032	101.4	—922	—5,922	—9,735	—8,642
	7 mos.	162	474,266	12,310	573,476	109,648	110,708	24,153	264,031	53,903	558,504	97.4	14,972	—20,133	—62,998	—3,246
Toledo, Peoria & Western	July	239	159,966	59	163,033	36,832	15,847	15,618	52,591	8,688	129,576	79.5	33,457	28,357	17,057	35,735
	7 mos.	239	933,898	743	954,421	171,795	94,306	102,746	339,239	63,812	771,898	80.9	182,523	148,969	99,848	99,380
Toledo Terminal	July	28	.....	.....	71,462	12,550	12,142	656	31,044	5,383	61,761	86.4	9,701	—4,487	24,718	7,168
	7 mos.	28	.....	.....	621,814	99,139	96,113	4,087	262,056	34,908	496,242	79.8	125,572	26,485	200,565	151,151
Ulster & Delaware	July	128	28,458	40,377	108,889	16,796	10,591	1,085	54,285	3,651	86,408	79.4	22,481	13,481	8,715	36,069
	7 mos.	128	214,807	57,973	537,264	107,540	85,894	7,978	267,738	26,823	495,973	92.3	41,291	1,691	—14,565	16,428
Union R. R. of Penna.	July	45	.....	.....	504,855	54,893	135,850	150	175,570	13,772	380,235	75.3	124,620	116,620	168,660	387,308
	7 mos.	45	.....	.....	3,169,731	576,668	995,092	1,122	1,548,410	100,591	3,221,842	101.6	—52,111	—123,085	248,152	1,398,159
Union Pacific	July	3,766	6,451,166	922,071	8,097,725	1,234,024	1,698,443	173,162	2,397,163	350,525	6,011,296	74.2	2,086,429	1,493,887	1,121,078	2,389,243
	7 mos.	3,765	40,690,244	5,739,524	51,256,314	6,263,577	11,783,319	1,231,773	15,379,973	2,420,207	37,998,741	74.1	13,257,573	8,915,507	7,153,859	9,315,984
Oregon Short Line	July	2,531	1,586,500	224,145	2,015,149	576,605	378,349	54,787	701,446	126,340	1,884,131	93.5	131,018	—134,623	—244,128	140,722
	7 mos.	2,531	12,984,194	1,334,095	15,621,612	2,770,139	2,745,590	382,179	5,028,210	888,748	12,164,481	77.9	3,457,131	1,459,877	796,665	1,722,054
Oregon-Wash. R. R. & Nav. Co.	July	2,337	1,356,591	172,928	1,712,870	301,952	257,728	69,756	614,072	126,306	1,384,737	80.8	328,133	142,247	34,189	53,363
	7 mos.	2,337	9,178,463	1,042,060	11,504,955	2,306,324	1,804,483	503,247	4,649,927	870,106	10,257,274	89.2	1,247,681	—39,116	—767,580	—64,220
Los Angeles & Salt Lake	July	1,249	1,103,619	310,113	1,574,204	224,888	253,421	73,770	520,195	85,939	1,221,292	77.6	352,912	202,274	58,354	298,026
	7 mos.	1,246	8,583,931	1,798,065	11,426,079	1,983,088	1,892,379	522,103	3,721,007	600,640	9,093,763	79.6	2,332,316	1,300,943	413,297	1,215,630
St. Joseph & Grand Island	July	258	244,027	5,262	258,291	51,867	35,546	3,342	92,685	17,624	200,058	77.5	58,233	45,354	13,050	47,005
	7 mos.	258	1,739,367	33,374	1,851,374	404,703	239,105	24,108	605,430	123,994	1,410,542	76.2	440,832	329,217	140,217	292,066
Utah	July	111	47,084	.....	47,261	13,616	20,679	440	14,121	5,174	54,030	114.3	—6,769	—10,506	—21,600	—18,795
	7 mos.	111	632,720	36	636,252	97,039	198,806	2,623	158,095	38,624	494,231	77.7	142,021	92,229	14,106	39,571
Virginian	July	601	1,166,429	12,741	1,248,482	137,919	194,543	16,123	274,925	32,067	654,961	52.5	593,521	443,518	517,387	511,415
	7 mos.	601	8,202,848	98,419	8,813,975	918,965	1,700,493	108,640	1,974,093	224,156	4,927,434	55.9	3,886,541	2,831,470	3,323,585	4,014,054
Wabash	July	2,523	3,984,657	365,308	4,650,087	580,420	813,459	213,038	1,954,881	269,159	3,852,497	82.8	797,590	554,651	94,952	697,513
	7 mos.	2,523	25,735,959	2,453,869	30,422,136	2,633,712	5,392,599	1,353,112	13,547,123	1,595,117	24,665,674	81.1	5,756,462	4,295,717	1,460,058	4,038,591
Ann Arbor	July	293	295,568	7,358	322,635	39,914	76,669	15,310	150,910	14,356	297,331	92.2	25,304	4,408	—17,942	41,162
	7 mos.	293	2,321,432	41,538	2,445,511	212,955	491,844	105,395	1,136,144	118,915	2,065,566	84.5	379,945	226,164	61,030	271,058
Western Maryland	July	891	1,114,581	18,523	1,245,810	141,046	215,037	46,538	332,582	45,670	786,227	63.1	459,583	379,583	384,806	415,791
	7 mos.	894	8,347,914	75,394	8,868,395	1,227,026	1,558,814	314,733	2,432,247	297,210	5,854,882	66.0	3,013,513	2,483,513	2,521,692	3,055,986
Western Pacific	July	1,051	927,899	112,601	1,150,839	192,928	176,200	67,978	464,110	48,845	992,901	86.3	157,938	66,891	50,881	141,998
	7 mos.	1,051	6,043,807	479,795	7,112,136	1,478,905	1,416,187	486,155	3,175,762	343,310	7,043,991	99.0	68,145	—579,886	—511,735	—336,187
Wheeling & Lake Erie	July	511	1,031,762	9,037	1,123,681	153,075	242,707	33,289	353,685	41,453	825,201	73.4	298,480	187,062	180,741	375,663
	7 mos.	511	6,622,928	69,637	7,114,501	841,819	1,893,491	243,201	2,346,011	285,137	5,616,954	79.0	1,497,547	774,380	743,811	2,264,522
Wichita Falls & Southern	July	203	74,883	123	77,893	13,343	7,992	2,296	19,532	2,947	45,710	58.68	32,183	27,970	22,489	15,916
	7 mos.	203	370,363	731	384,401	76,782	60,012	17,162	129,220	24,845	305,022	79.35	79,379	48,727	19,589	79,677

News Department Continued on Next Left Hand Page

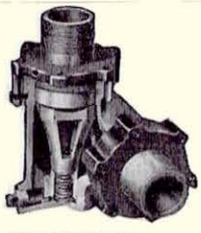
MAINTENANCE CONTROL STARTS WITH LOCOMOTIVE DESIGN

LONG LIFE for pins and bushings should be built into every new locomotive by incorporating the Tandem Main Rod Drive.

This construction distributes the burden of heavy piston thrusts over two axles and four outside main crank pins.

The work of the main pin is reduced 25 to 50 per cent. By providing two pairs of "mains" instead of one, a better power distribution is secured and the wear on driving brasses and main and side rod bushings is reduced. Improved power distribution also reduces the stresses on machinery and reduces slipping.

Comparative tests show a reduction of over 80% in rod maintenance due to the Tandem Main Rod Drive. Then, too, the increased locomotive service is worth a lot.

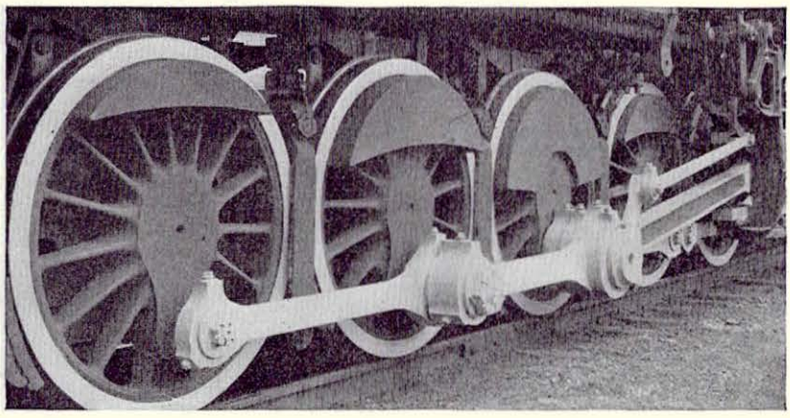


THE FRANKLIN SLEEVE JOINT

An improved flexible joint that gives long service with little attention.

FRANKLIN RAILWAY SUPPLY CO., INC.

NEW YORK CHICAGO ST. LOUIS SAN FRANCISCO MONTREAL



TANDEM MAIN ROD DRIVE

News

(Continued from page 411)

gallon tank, and one of a portable air compressor, fitted with a silencer, for unloading tank cars. Elaborate tables are given of the cost of hauling milk in tank trucks.

Western Pacific Cuts Salaries

The Western Pacific has made a horizontal reduction of 10 per cent in the salaries of all employees receiving $300 or more a month.

Rate Expert of Kansas Commission Dies

J. W. Scott, head of the rate department of the Kansas Public Service Commission, died on August 31 at Kansas City. Previous to joining the commission about five years ago, Mr. Scott had been connected at various times with the Atchison, Topeka & Santa Fe, the Great Northern and the Kansas City Southern.

U. P. Warehouse Opened at Los Angeles

The Overland Terminal Warehouse Company, a subsidiary of the Union Pacific, was opened to the public on August 25. The warehouse is adjacent to, and is a unit of the Union Pacific freight terminal. A total area of 432,000 sq. ft. of floor space is contained in the six floors and basement.

Burlington Shop at Aurora Burned

The large construction building of the coach shops of the Chicago, Burlington & Quincy at Aurora, Ill., was entirely destroyed by fire on September 2, with 27 coaches housed in the structure. The other shops were not touched by the blaze. The shops were opened on August 31, after having been closed for several weeks. The origin of the fire was not discovered.

Railroad Ties for China

Recently orders have been placed in the Pacific Northwest on behalf of China for about 9,000,000 bd. ft. of railroad ties. All of this material is to come from the Willamette and Columbia River districts and will be loaded and shipped during September and October. This is the first tie order that has been placed in this country by Chinese interests in recent times.

Albany Port District

Albany, N. Y., following the deepening of the Hudson river and the construction of docks and other facilities, is now a full fledged seaport, and the Albany Port District Railroad has filed with the New York Public Service Commission a tariff of switching rates, including demurrage charges. The tracks of the Port District connect with those of the Delaware & Hudson and the West Shore division of the New York Central.

A press dispatch of September 8 reports the loading at Albany of five locomotives on to the steamship Belmoira for Russia. These locomotives, made at the works of the American Locomotive Company at Schenectady, are five feet gage and are transported from Schenectady to Albany over the New York Central on cars, "knocked down."

Ohio Valley Shippers' Board

The 30th meeting of the Ohio Valley Shippers' Advisory Board will be held at Louisville, Ky., on September 14-15. The principal speaker at the meeting will be Elisha Lee, vice-president of the Pennsylvania, who will address the meeting on "The Financial Needs of the Railroads," which address will deal largely with the railroads' application for a 15 per cent increase in freight rates.

Mexican Railways Suffer from Floods

Heavy rains in Mexico continue to cause extensive damage to railroad property in all parts of the country and especially in the southern portion. Frequent landslides have occurred on the Interoceanic Railway (part of the National Railways), particularly at Chavarrillo. Traffic between Cosamaloapan and San Cristobal, and between Novillero and Tuxtilla, on the Southeast division, has been blocked for some time.

Pullman Constructing Enclosed Section Sleeping Cars

The Pullman Company has recently placed in service six sleeping cars which contain sections, comprising lower berths and individual toilet facilities. Two of these cars have been placed in service on the Wabash between Chicago and Detroit, Mich., while four others have been placed in service on the Southern Pacific between San Francisco, Cal., and Portland, Ore. The rate charged for the section, which accommodates one person, is one railroad fare plus a pullman fare of double the price of a lower berth.

The car includes 16 sections, 8 on each side, with a private lavatory for each section. The berth is 30 in. wide, compared with 41 in. in standard sleeping cars. The curtains, which can be opened or closed at will by cords by the occupants, hang several inches from the side of the berth so as to allow room for dressing and to permit the occupant to enter the lavatory without going into the aisle. The lavatory, located at the end of each section, has a steel door, the frame of which is set at an angle to conserve space. The upper portion of the section is used for the storage of bedding.

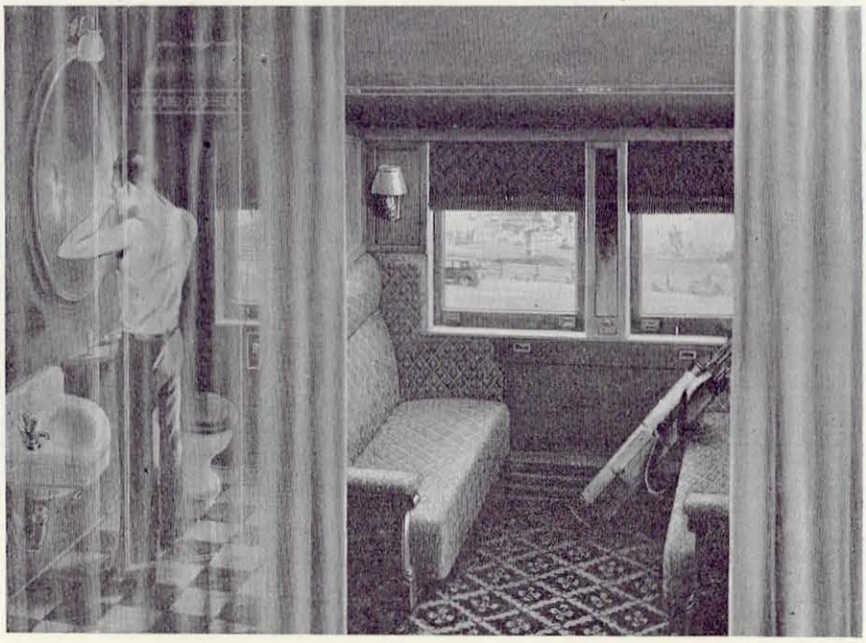
Injunction Against Valuation Costs

The Oregon Short Line has applied to the Federal court at Boise, Idaho, for an injunction to prohibit the state auditor from certifying to the valuation placed on the railroad by the Board of Equalization. The railroad contends that in comparison with other property it has been assessed $23,256,000 too much this year on a valuation of $56,884,000. The state contends that the railroad merely stated that it was improperly assessed without substantiating its claim and for that reason no injunction should be issued.

Hudson Bay Rates on Crow's Nest Basis

Canadian National grain rates to Churchill, on Hudson Bay, are on exactly the same basis as the Crow's Nest basis of rates from Canadian National stations to Fort William and Port Arthur and also to Vancouver and Prince Rupert for export, said R. L. Burnay, traffic vice-president of the national system, in a statement in Montreal replying to published complaints of George H. Smith, freight rates expert for the Saskatchewan government.

"The Crow's Nest basis rates were published in accordance with general order



Toilet Facilities Are Provided for Each Section

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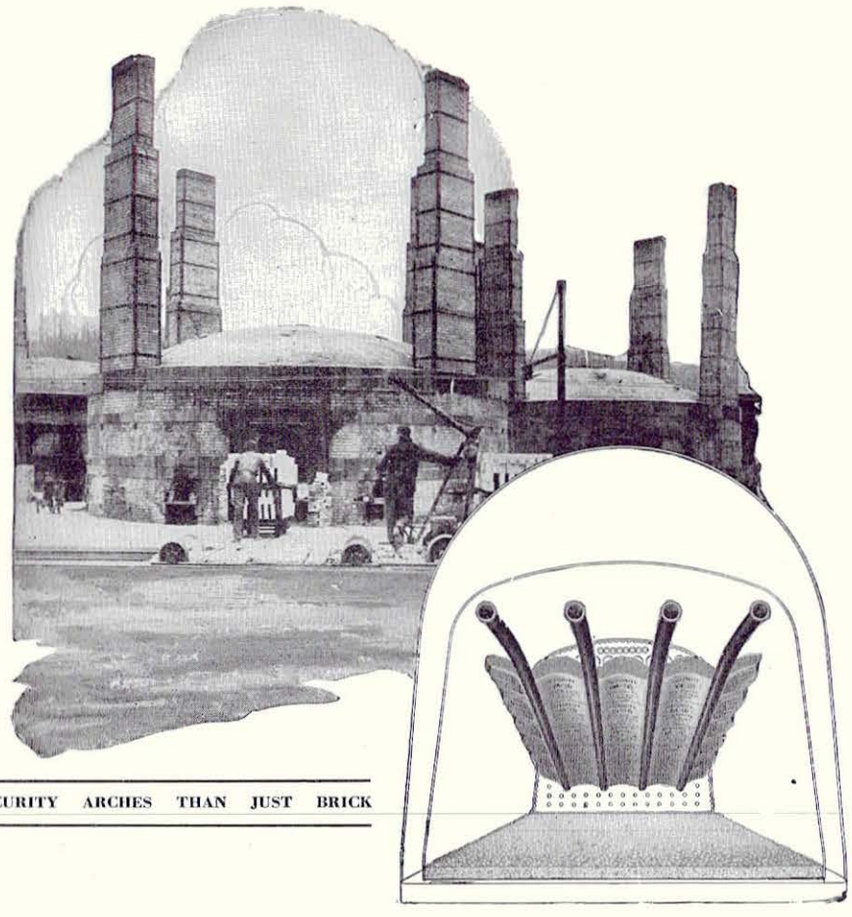


THERE'S MORE TO SECURITY ARCHES THAN JUST BRICK

AMERICAN ARCH COMPANY

Brought Order out of Chaos

"Go-as-you-please" methods of locomotive Arch design created a serious problem in the early days of Arches.

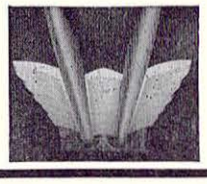
Every new design of locomotive meant a different tube spacing and a varying size and shape of Arch Brick.

Then, American Arch Company brought order out of chaos. Arch tube spacing was standardized. Arch Brick were standardized. As time went on fewer shapes and sizes were needed to meet any Arch requirement. A serious store problem had been solved.

Even today, American Arch Company is loath to add new brick shapes to complicate the work of the stores department. Its research is rather along the lines of simplification of stocks.

While only one of the many services of the American Arch Company to the railroads this work has a distinct dollars and cents value.

HARBISON-WALKER REFRACTORIES CO.
Refractory Specialists



AMERICAN ARCH CO.
INCORPORATED
Locomotive Combustion Specialists » » »

No. 448, date August 26, 1927 of the Board of Railway Commissioners for Canada," he continued, "which required the Canadian Pacific to publish the Crow's Nest Pass grain rates from all points on the Canadian Pacific branch lines to Fort William, Port Arthur and Westfort—such basis already being in effect from Canadian Pacific main line points—and that all other railway companies adjust their rates on grain to Fort William, Port Arthur, Westfort and Armstrong to the rates so put into effect by the Canadian Pacific, and that the rate from prairie points to Vancouver and Prince Rupert for export shall be on the same basis as the rates to Fort William."

Rates on Cotton and Woolen Products Suspended

The Interstate Commerce Commission has suspended from September 8 until April 8, 1932, the operation of tariffs published by various agents and individual carriers which propose to cancel commodity rates on cotton, woolen, etc. from points in southwestern territory, from, to and between points in southern territory and from, to and between points in official territory. It was proposed to apply in lieu thereof class rates or rates based on a fixed percentage of first class.

South Carolina Truck Rates

Motor freight rates, averaging 10 per cent above railway charges, have been prescribed by the Railroad Commission of South Carolina for regular truck lines operating in that State, according to a recent despatch to the Wall Street Journal. The new highway rates, which will become effective October 1, have been under consideration by the Commission since 1928; the charges in excess of the railway rates were justified on the basis of the additional service provided by the truck lines in connection with store-door pick-up and delivery operations.

Lower Cotton Rates to New Orleans Proposed

Southwestern railroads have petitioned the Interstate Commerce Commission for a modification of its orders which prescribed a revision of freight rates on cotton to enable them to make reductions in rates to New Orleans to meet truck and barge competition without making corresponding reductions to Mobile. The commission requires an inflexible relationship in the rates to New Orleans and Mobile and the carriers are asking relief similar to that granted in the rates to Texas ports.

Crushed Stone Rates Suspended

The Interstate Commerce Commission has suspended from September 9, until April 9, 1932, the operation of tariffs published by various agents and individual carriers which propose to cancel the present commodity rates and apply in lieu thereof the full classification basis or combination rates on stone, limestone, granite, marble or slate, crushed, ground, pulverized or powdered, and related articles, including articles grouped therewith, in straight or mixed carloads, interterritorial, between points in the South, on the one hand, and points in Official and Western Trunk Line territories, on the other hand; also between points in the South and Southern gateways and Ohio and Mississippi river crossings in so far as they apply on traffic between points in the South, on the one hand, and points in Official, Western Trunk Line and Southwestern territories, on the other hand, which will result generally in increases.

Reduced Passenger Fares in Mexico

As a means of regaining some of the passenger traffic that has been lost to buses, the National of Mexico is offering special reduced rates to organizations controlling a considerable amount of passenger traffic. In conformity with this plan, members of the Mexican Federation of Students, which includes students all over the country, will be entitled to a 50 per cent reduction on initial trips and a 25 per cent reduction on return trips. The Confederation of Hiking Clubs of Mexico, which is composed of over 25,000 members, has also been offered low round trip rates.

Experiment with Transcontinental Motor Freight Service

The first attempt at transcontinental motor freight service was begun on August 29 when a truck and trailer, carrying 20 tons of dates and walnuts, left Los Angeles, Cal., for New York. This shipment is part of an experiment being conducted by the General Motors Corporation to determine if California fruit can be carried, to New York by truck, expeditiously and in good condition. The truck and trailer unit, which was equipped with refrigeration service, was scheduled to stop in 25 important shipping centers. It was estimated that the trip to New York would take about 12 days.

I.C.C. Calls For Data on Use of Private Freight Cars

A questionnaire calling for detailed information regarding the ownership and use of private freight cars has been addressed to the railroads by the Interstate Commerce Commission in connection with its investigation, Ex Parte No. 104, into the practices of carriers affecting operating revenues or expenses. Among the data asked for are a statement of the mileage made by private cars on the line of respondent during the month of July, 1931, facts with respect to rentals or other allowances paid to private car lines during the year 1930, and information as to rental charges against shippers for the use of private cars.

Safety Work for October

The regular monthly circular of the Committee on Education, Safety Section, American Railway Association, containing the October program for safety committees, is addressed to "the public" and begins with a little sermon on the importance to the traveler of a service which is safe, dependable and comfortable. Attention is called to the fact that, in the year 1930, the number of passengers killed in train accidents on the railroads of the United States was only one in 101,571,000, much the lowest ratio on record.

Commenting on the 43 fatal accidents to passengers in 1930 classed as not due to train accidents, the circular points out the obvious and simple means available to the passenger to secure his own safety. The most prominent injunction is, never to open vestibule doors.

Southern Pacific Opens Tubercular Sanitarium

The Southern Pacific on September 2 dedicated its tubercular sanitarium at Tucson, Ariz., the celebration including a Chamber of Commerce luncheon and open house at the sanitarium during the afternoon and evening. The construction expenses of the project were borne by Edward S. Harkness of New York, director and member of the executive committee, as a gift to the railroad employees in appreciation for their loyalty and efficiency.

The series of buildings are grouped around a park and provide accommodations for approximately 100 patients, a medical staff, and attendants. The sanitarium represents a total investment of about $500,000. Operating expenditures will total $125,000 or more annually. About 40 patients will be transferred to the new institution within a few days.

Foreign

Reparations a Heavy Burden on German Railways

The German National Railroad Company, during the year ending December 31, 1930, experienced a gross revenue decline of 14.63 per cent as compared with 1929 and thus, as the current statement points out, "the dark prospects which we were compelled to foreshadow in our previous report have become a reality." The 1930 gross revenues were equivalent to $1,087,735,000; operating expenses were $973,504,000 and net revenues $114,231,000. These compare with 1929 gross revenues of $1,274,204,000, operating expenses of $1,069,453,000 and net revenues of $204,751,000.

Figures comparing revenues, expenses and net revenues of the past six years are as follows:

	Gross Revenues	Operating Expenses (000 omitted)	Net Revenues
1930	$1,087,735	$973,504	$114,231
1929	1,274,204	1,069,453	204,751
1928	1,227,890	1,022,067	205,822
1927	1,199,353	989,794	209,559
1926	1,080,710	875,983	204,728
1925	1,111,222	946,002	165,220

Net revenues in 1930, for the first time since the formation of the German National Railroad Company under the Dawes Plan, were insufficient to meet the

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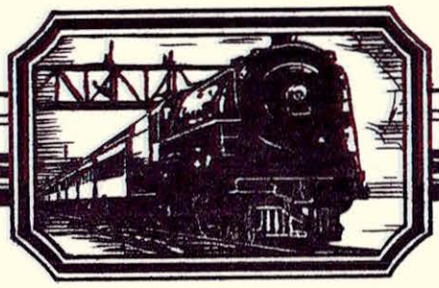

Alco Alco

TO ECONOMIZE— MODERNIZE

During the year 1920, 24½ per cent of the locomotives on Class I lines were reported as unserviceable. In 1921 and 1922 this percentage remained practically the same. However, starting with 1923 strenuous efforts to improve this condition began to show definite results. By 1929 this percentage had been reduced to 16.4. And the last report of the condition of motive power showed that on July 1st, 1931, only 10.9 per cent of the number of locomotives on line were in need of classified repairs.

But, is this true economy?

Isn't it true that when a machine reaches a certain stage of obsolescence of design it should be discarded regardless of the fact that it could still be put in condition to operate?

Our most outstanding industrial successes today quickly scrapped equipment of obsolete design—sometimes even before the shine was worn off.

They knew they were investing in greater future profits and greater competitive advantages.

It paid them—why wouldn't the same policy pay our railroads?

American Locomotive Company
30 Church Street New York N.Y.

Alco Alco

annual reparations payment of $157,080,000 levied on the railroads. This levy remains the same in amount, although its status has been changed, under the Young Plan. Under the Dawes Plan it took the form of interest on reparation bonds while now it is a deduction from net revenues and the unamortized portion is carried on the liability side of the balance sheet as a "Reserve on account of depreciation of railway property acquired from the Government."

The 1930 reparations tax and other charges were met only by drawing upon the accumulated profit and loss credit balance of $42,589,000 and by an additional non-recurring profit and loss credit of $31,787,000 resulting from a cancellation by the government of loans made by it to the railway in 1926 and 1929. It is explained that these government loans were advanced to make work in the railway construction field in connection with unemployment relief measures.

In commenting on the burdens which the railway bears on behalf of the Government, the management expresses its conviction that "the company is bearing burdens for the Government which are most decidedly too heavy and urgently require to be lightened."

It lists the items of expenditure involved as follows:

Reparations tax	$157,080,000
Dividends on preferred stock issued to the Government without valuable consideration in connection with reparations	8,330,000
Transport Tax	68,782,000
Increased charges in respect of pensions, etc.	53,788,000
Increased cost arising from the new demarcation of the frontiers	4,284,000
Total	$292,264,000

The foregoing total represents more than 25 per cent of the 1930 gross revenues although in this connection it should be pointed out that the transport tax does not enter the financial accounts of the railways. The transport tax is a levy which the railway collects for the account of the government and pays over to it without any deductions. "From the point of view of the public, however," the report points out "the tax is part of the consideration paid for the services rendered by the company and it reacts on the traffic just as much as a correspondingly higher tariff would. It is also a direct burden from the point of view of the company in that it makes it impossible to impose tariffs on the scale which a proper business-like conduct of the company's affairs would necessitate."

"It is not generally realized," the statement continues, "how great are the burdens which the company bears in the interest of the Government. Actually they are so heavy, however, that even in periods of prosperity no funds could be made available for the purpose of overtaking the arrears of maintenance and repair work left over from the war and post-war periods. Still less, consequently, is it possible to build up the reserves which every business undertaking must have to meet periods of depression. In bad years the result will inevitably be that the property of the Government, which the company administers, will deteriorate in value."

Freight traffic during 1930 produced $675,717,000 of the total gross revenues as compared with freight revenues of $829,525,000 in 1929. A total of 399,544,000 metric tons were handled as against 485,921,000 in 1929. The 1930 passenger traffic accounted for revenues of $320,236,000 as against passenger train revenues of $338,722,000 in the previous year. Incidental revenues fell from a 1929 figure of $105,957,000 to $91,781,000 in 1930. It will thus be seen that the drop in freight traffic accounted for more than 80 per cent of the gross revenue decline in 1930 as compared with 1929.

L. M. S. Reorganizes Commercial Department

The London, Midland & Scottish of Great Britain has recently effected a reorganization of its commercial department designed to grant district officers a greater amount of local autonomy and otherwise strengthen the department.

The new plan, according to the outline published in a recent issue of Modern Transport (London), provides for the appointment of a passenger manager and four district passenger managers while four existing district freight managers will become district freight and passenger managers. Prior to the reorganization, passenger traffic matters were handled in the chief general superintendent's department with four divisional passenger commercial superintendents.

This reorganization follows a similar change on the Southern of Great Britain. The latter, as reported in the *Railway Age* of February 28, page 474, reorganized its traffic solicitation organization along lines designed to cope with conditions attending the growing competition of highway carriers.

Thomas, Loyal to MacDonald, Forced Out of Rail Union

J. H. Thomas, parliamentary general secretary of the National Union of Railwaymen of Great Britain, who has been officially connected with that organization for 35 years has resigned his position with the union rather than accede to its demand that he quit his cabinet post in the coalition ministry, headed by J. Ramsay MacDonald, who was also prime minister of the defunct Labor government. The demand for Mr. Thomas' resignation from the government, according to a dispatch from London to the Associated Press, came at a recent meeting of the union after he had explained why, in his opinion, he had no alternative but to support Mr. MacDonald.

Mr. Thomas, who is a privy counselor, holds the post of secretary of state for dominion affairs and colonies in the new government and is one of three former Labor government ministers who are participating with Prime Minister MacDonald in the coalition government. The others are Philip Snowden, chancellor of the exchequer, and Lord Sankey, lord chancellor.

Supply Trade

J. Fred Mehlhope has been appointed district sales manager of the **Newton Steel Company** with headquarters at 310 S. Michigan avenue, Chicago.

William A. Irvin, vice-president of the American Sheet & Tinplate Company has been elected a vice-president of the **United States Steel Corporation,** with headquarters at New York.

The Page Steel & Wire Co., Bridgeport, Conn., has opened a southeastern district sales office at 1520 Healey building, Atlanta, Ga. **R. J. Teeple** has been placed in charge.

Harrison Hoblitzelle, executive vice-president of the **General Steel Castings Corporation,** Eddystone, Pa., was elected president at a meeting of the board of directors on September 2, to succeed **R. H. Ripley,** who resigned. Mr. Ripley continues as chairman of the board.

The National Acme Company, Cleveland, Ohio, has entered into a licensed agreement with the **Dardelet Threadlock Corporation** to manufacture, use and sell bolts, nuts, and screw machine products, threaded with the Dardelet self-locking screw thread.

The Easton Car & Construction Co., Easton, Pa. has purchased the industrial division of the **Lakewood Engineering Company** and hereafter the complete line of tier trucks, electric trucks, trailers, skids and industrial cars will be manufactured at Easton, Pa.

James J. Black has been appointed sales engineer of the **Trailer Company of America,** Cincinnati, Ohio, which was recently formed through a merger of the Lapeer Trailer Company and the Trailmobile Company. Mr. Black had been associated for nine years with the Lapeer Trailer Company prior to the merger.

The Ludlow Valve Manufacturing Company, Troy, N. Y., will manufacture its products for Canadian distribution under the name of **The Canadian Ludlow Valve Manufacturing Company, Limited,** 930 Wellington street, Montreal, Que., with factories at Three Rivers, Que., St. Thomas, Ont., and Fort William, Ont.

W. C. Bruton, sales engineer for the **American Manganese Steel Company,** Chicago Heights, Ill., with headquarters at Oakland, Cal., has been appointed district sales manager for the Pacific Northwest territory, which comprises Oregon, Washington, British Columbia and the Coeur D'Alene district in Idaho.

The Ames-Baldwin-Wyoming Shovel Company, Boston, Mass., has been organized following the sale of shovel manufacturing assets of Beall Brothers, Alton, Ill., the Ames Shovel & Tool Co., Boston, the Pittsburgh Shovel Company, Pittsburgh, Pa., the Wyoming Shovel Company, Wyoming, Pa., the Baldwin

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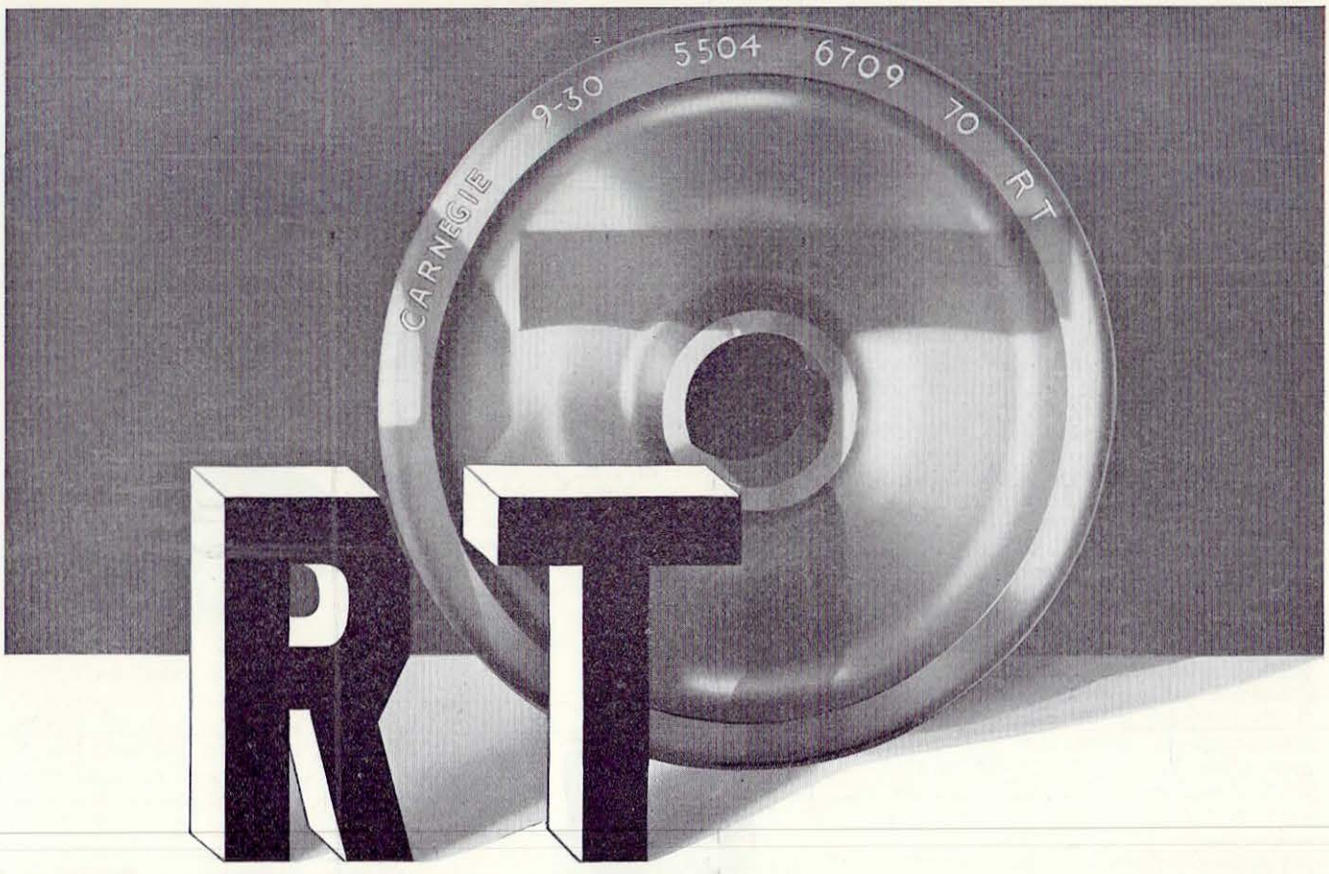

The MARK of EXTRA SERVICE

STAMPED on Carnegie Wrought Steel Wheels, the initials "R T" (Rim Toughened) identify wheels particularly adapted to modern heavy-duty service—wheels that will give you greater service, greater safety, greater economy. These initials indicate the additional refinement of heat treatment, the process of which produces a wheel with an especially tough rim and with high physical properties—a wheel that has been demanded by, and made especially for the ever-increasing weight and speed of modern transportation. Accurate machining insures perfect rotundity with a consequent increase in riding comfort.

Carnegie Rim-Toughened Wrought Steel Wheels are furnished for passenger, engine truck and tender service. Carnegie Light Weight Freight Car Wheels, rim-toughened, are also available for 70-ton freight service.

The outstanding advantages of wrought steel are well known. Let our wheel engineers bring you complete details of this further improvement. Carnegie Rim-Toughened Wrought Steel Wheels have created a new standard of service and value.

CARNEGIE STEEL COMPANY

PITTSBURGH, PENNA.

Subsidiary of United States Steel Corporation

154

CARNEGIE WROUGHT STEEL WHEELS

Tool Company; Parkersburg, W. Va., and Hubbard & Co., Pittsburgh. The executive offices of the new company are located at North Easton, Mass. The officers are: President, **Richard Harte**; sales manager, **N. T. Jacobs**; and treasurer, **L. J. Reay.**

B. T. Ehrnman, formerly in the Chicago office of the **International-Stacey Corporation,** Columbus, Ohio, has been transferred to St. Louis, Mo. as division manager with office in the Railway Exchange building, and **A. G. Bradbury,** division manager, has transferred the headquarters of the Michigan division from Jackson, Mich. to the Stephenson building, Detroit. Mr. Bradbury was formerly in charge of the Detroit office of the International Derrick & Equipment Company which was located in the General Motors building.

George W. Wildin, Pittsburgh, Pa., representative of The Cardwell Westinghouse Company, severed his connection with that organization on August 1 and will open an office at 207 Westinghouse building, Pittsburgh. He will retain his connection with the Westinghouse Air Brake Company in the capacity of consulting engineer. In his new field of endeavor, Mr. Wildin plans to take up the work of railway and industrial engineering and also his organization will act as representative for supply concerns having devices of interest to the railway and industrial fields. Mr. Wildin entered the railway field direct from college. He served consecutively as mechanical draftsman, engineer of tests, freight car repairman, machinist, locomotive fireman, locomotive engineman, general locomotive and car inspector, mechanical engineer, assistant mechanical superintendent, mechanical superintendent, general mechanical superintendent and general manager, with experience on eight different railroads in different parts of the United States and Mexico, covering a

George W. Wildin

period of 26 years. His industrial experience covers a period of eight years as general manager of The Westinghouse Air Brake Company, in charge of production, engineering and tests, and five years in the sales department of The Westinghouse Friction Draft Gear Company and The Cardwell Westinghouse Company. Mr. Wildin is affiliated with several engineering and railway organizations; he is a past president of the American Railway Association, Mechanical Division, also of the New York Railroad Club and the Railway Club of Pittsburgh.

OBITUARY

Edward Douglas Jackson, general manager of the Syntron Company, Pittsburgh, Pa., who died on August 18, as noted in the *Railway Age* for September 5, was born at Front Royal, Va., in 1882, and graduated from the Virginia Military Institute in 1902. In 1903, he entered the service of the Baltimore & Ohio and was advanced to assistant engineer maintenance of way in the general office at Baltimore, Md. He left this road in 1918 to go with the Chipman Chemical Engineering Company, Inc., of New York, of which company he was later

Edward Douglas Jackson

appointed vice-president. In 1922, Mr. Jackson joined the Syntron Company as general manager, which position he held until his death.

Alfred H. Mulliken, formerly president and one of the founders of the Pettibone Mulliken Company, Chicago, who died on September 2, as noted in the *Railway Age* for September 5, devoted 60 of the 63 years of his active career to the railway supply business, during 48 years of which time he was connected with the Pettibone Mulliken Company. His career began on November 1, 1868, when, at the age of 15, he entered the service of Crerar, Adams & Co., Chicago, as an office boy. Twelve years later, he joined with Asa G. Pettibone, a banker to form the firm of Pettibone & Mulliken. In 1885, the firm was incorporated as Pettibone, Mulliken & Co., with Mr. Mulliken as secretary and treasurer. It was this firm that began the manufacture of the Jenne track-jack and the roller rail bender. In July, 1912, the company was re-organized under the name of the Pettibone Mulliken Company and from that time until 1928, Mr. Mulliken served as president. In 1922, he joined in the organization of the investment banking firm of Mulliken & Roberts of New York, of which he served as president and chairman of the board until his death. In 1928, he dis-

Alfred H. Mulliken

posed of his holdings in the Pettibone Mulliken Company and moved to New Canaan, Conn., where he remained until his death. Mr. Mulliken was a director of the National Association of Manufacturers, the Continental Illinois Bank of Chicago and the Railway Business Association. During the World War, he served as a committee of one at Washington, representing all the frog and switch manufacturers in the United States in their relationship with the government.

John E. Nelson, president of Jos. E. Nelson & Sons, Inc., Chicago, died at Green Lake, Wis., on September 4, following a lingering illness. He was born on October 13, 1881, and after finishing

John E. Nelson

high school, learned the trade of brick layer. After following this trade for a year or two, he entered the employ of Nelson & McLeod, railroad contractors, as field superintendent, in charge of work for western railroads. In 1904, he

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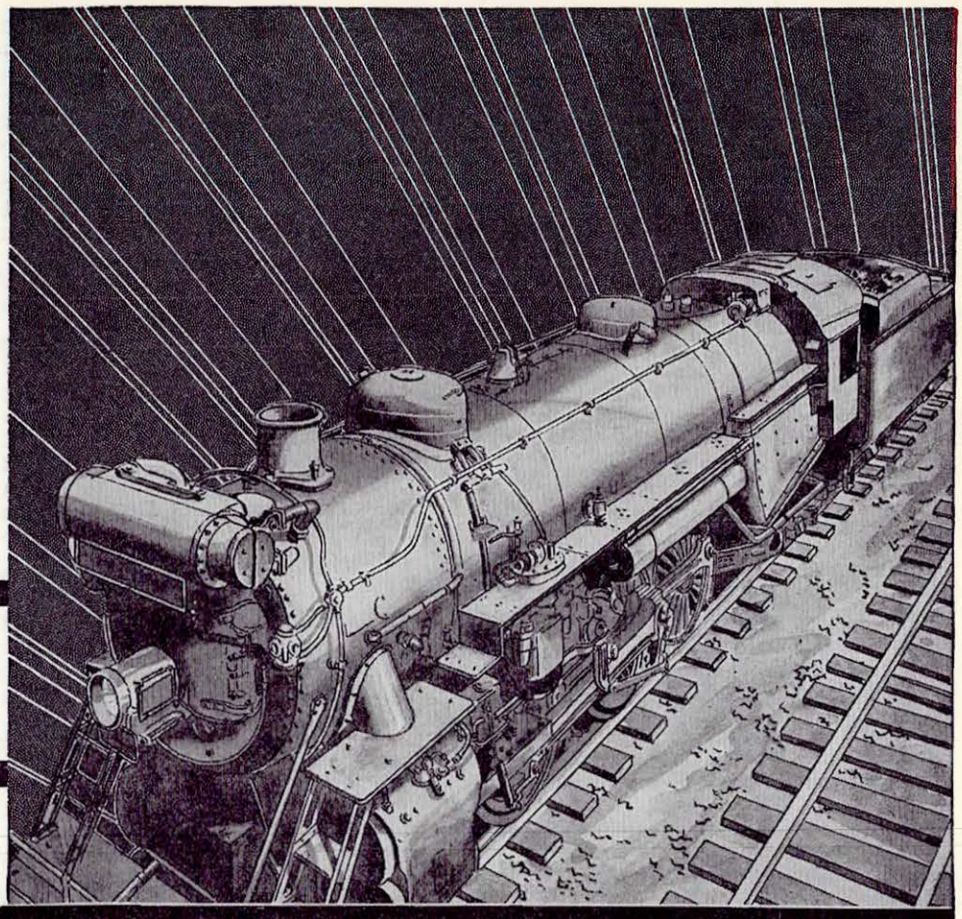
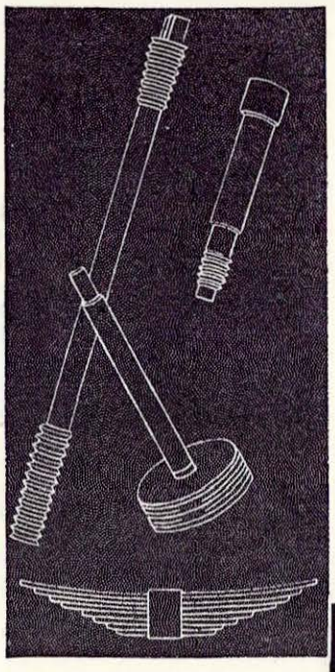
AGATHON NICKEL IRON TRADE MARK

ALLOY STEELS



are removing old limits of DESIGN



MANY AN IDEA for improving locomotive performance in the past has been modified regretfully because of inadequate materials.

Today many of these handicaps have been removed.

Alloy Steels and Irons, developed by Republic Steel Corporation metallurgists, are providing better resistance to corrosion, greater strength and higher fatigue resistance.

Whether it be springs, rods, axles, motion work pins, tubes or staybolts, Republic Steel Corporation has carefully worked out a material specifically to meet the conditions of modern railroading.

A material that will be stronger and last longer.

Wherever you use iron or steel, consult Republic Steel Corporation for better materials.

REG. U.S. PAT. OFF. TONCAN COPPER Mo-lyb-den-um IRON

CENTRAL ALLOY DIVISION

REPUBLIC STEEL CORPORATION

Massillon, Ohio

was appointed general superintendent and was made a partner and general manager of the firm when it became known as Jos. E. Nelson & Sons. Upon the death of his father in 1921, the business was taken over by the sons as a partnership and on February 10, 1930, Jos. E. Nelson & Sons, Inc., was incorporated by John E. Nelson and William H. Nelson to take over the general contracting business of the partnership, Jos. E. Nelson & Sons. At this time, John E. Nelson was elected president, which position he has held until the time of his death.

Equipment and Supplies

FREIGHT CARS

THE PACIFIC FRUIT EXPRESS has ordered steel for 500 underframes which it will construct in its own shops from the Consolidated Steel Corporation, Los Angeles, Cal.

THE UNITED STATES NAVY DEPARTMENT has ordered one flat car of 30 tons' capacity from the Koppel Industrial Car & Equipment Company. This car is for service at the Philadelphia Navy yard. Inquiry for this equipment was reported in the *Railway Age* of August 22. The Navy Department has also ordered from the J. G. Brill Company through the Hardie-Tynes Manufacturing Company one Helium compressor car.

PASSENGER CARS

THE CANADIAN PACIFIC has ordered two gas-electric rail motor cars from the Ottawa Car Manufacturing Company, Ottawa, Ont. These cars will be equipped with Electro-Motive Company model No. 148 eight-cylinder power plants and the electrical equipment will be supplied by the Canadian Westinghouse Company.

IRON & STEEL

THE MISSOURI PACIFIC is inquiring for 700 tons of structural steel for a bridge at St. Louis, Mo.

THE NEW YORK, NEW HAVEN & HARTFORD has ordered 150 tons of steel for a bridge at Mt. Vernon, N. Y., from the Shoemaker Bridge Company.

SIGNALING

THE BALTIMORE & OHIO has ordered from the Union Switch & Signal Company material for an electro-mechanical interlocking machine, 44 levers, to be installed at Leipsic Junction, Ohio, the crossing of the New York, Chicago & St. Louis. Color-position-light signals will be used. The interlocking will work in cooperation with the Union centralized traffic control system which is being installed between North Lima and Roachton.

Construction

CANADIAN NATIONAL.—This company has awarded to E.G.M. Cape & Company, Montreal, Que., a contract for placing a reinforced concrete deck, and for waterproofing, on the bridge which carries Dorchester street over the excavation for the Canadian National's new central passenger terminal in Montreal. The bridge deck will be 615 ft. by 104 ft., while the amount of the contract is understood to be approximately $150,000. The bridge is expected to be open for traffic by the end of the current month. A contract has also been given to the Hamilton Wrecking Company, Hamilton, Ont., for the demolition of station and express buildings on Stuart and King streets, Hamilton, which were replaced by a new station recently opened at James, John and Murray streets.

CANADIAN PACIFIC.—Contracts have been let to the Canadian Bridge Company for the rebuilding, to Cooper's E-60 loading, of five bridges on this road's Galt subdivision and to the Hamilton Bridge Company, Hamilton, Ont., for similar work on the Windsor subdivision.

CHESAPEAKE & OHIO.—This road has awarded to the Walsh Construction Company, Indianapolis, Ind., a contract for the construction of an undergrade crossing to cost approximately $100,000, at Bellevue, Ky. The authorization for this project was reported in the *Railway Age* of July 11, page 73.

CHICAGO UNION STATION COMPANY.—Plans have been completed for the construction of a new power house at Chicago to serve the Chicago Union Station, the new post office building and adjacent railway facilities, at a cost of about $2,000,000. The new power plant, which will occupy an area of 14,375 sq. ft., is to be constructed on the west bank of the Chicago river, midway between Taylor street and Roosevelt road. The plant will be the first unit of several, the remainder of which will be constructed at a later date. It will be equipped with water-tube boilers, with forced draft, chain grate stokers and appliances to reduce smoke to a minimum. It will have four 1,600-hp. boilers and a total capacity of 16,000 hp. The present plant at the northeast corner of Canal and Harrison streets will be dismantled after the new structure is ready for service, since its location is included in the site of the new post office, for which air rights were purchased by the government from the Union Station Company. Work is already under way by the Union Station Company for the preparation of the post office site. A track has been closed and track platforms, the signal and interlocking system and underground utilities are being relocated to permit the building of foundations for the post office building. The preparatory work, which commenced on August 31, will cost approximately $400,000. It is expected that the contracts for the power house will be let in the near future.

DELAWARE & HUDSON.—This company has awarded to the New England Construction Company, Springfield, Mass., a contract for the elimination of a grade crossing in Elsmere, N. Y. The cost of this work is to be based on unit prices.

MISSOURI-KANSAS-TEXAS.—A contract has been let to the H. L. Cannady Construction Company, Tulsa, Okla., for the construction of a 400-ft. viaduct over Third street and the tracks of the M-K-T in that city, at a cost of $58,000.

PUBLIC SERVICE COMMISSION OF NEW YORK.—In connection with the elimination of grade crossings of the New York Central, Erie and Canadian National at Austin, Amherst, Tonawanda and other streets in Buffalo, N. Y., the commission has approved detailed plans, specifications and estimates of cost for the Austin street approach to the elimination structures.

TORONTO, HAMILTON & BUFFALO.—This road has awarded to the Dominion Construction Company a contract for the construction of an underpass to carry King's Highway No. 20 under the railroad tracks at a point about nine miles from Welland, Ont. The greater part of the cost will be borne by the Province of Ontario.

Financial

BUFFALO & SUSQUEHANNA.—*Valuation.*—The final value for rate-making purposes of the property owned and used for common-carrier purposes as of 1919 was placed at $9,650,000 in a final valuation report issued by the Interstate Commerce Commission. The value of the property used but not owned was placed at $442,805.

CANADIAN NATIONAL.—*Bonds.*—Within a short time it is believed the government of Canada will seek a loan of about $50,000,000 for the Canadian National. Previously most of these issues have been floated in New York and in view of the present plenitude of money there, it is expected the funds will again be sought in Wall Street where an interest rate as low as 3½ per cent might, it is believed, be obtained, in view of the fact that the issue would be an obligation of the Canadian government.

DULUTH, SOUTH SHORE & ATLANTIC—*Valuation.*—The Interstate Commerce Commission has found the final value for rate-making purposes of the property owned and used for common-carrier purposes as of 1916 to be $17,250,000. The investment account as readjusted, the report says, indicates an investment of $43,001,249, but this included the par value of securities issued or assumed in the amount of $37,399,740, the money value of which the commission is unable to state.

ERIE.—*Acquisition.*—This company and the Jefferson Railroad have applied to the Interstate Commerce Commission for authority to acquire, for operation by the Erie, a part of the Honesdale branch of the Delaware & Hudson at Honesdale, Pa., including 6,000 feet of track and 12,700

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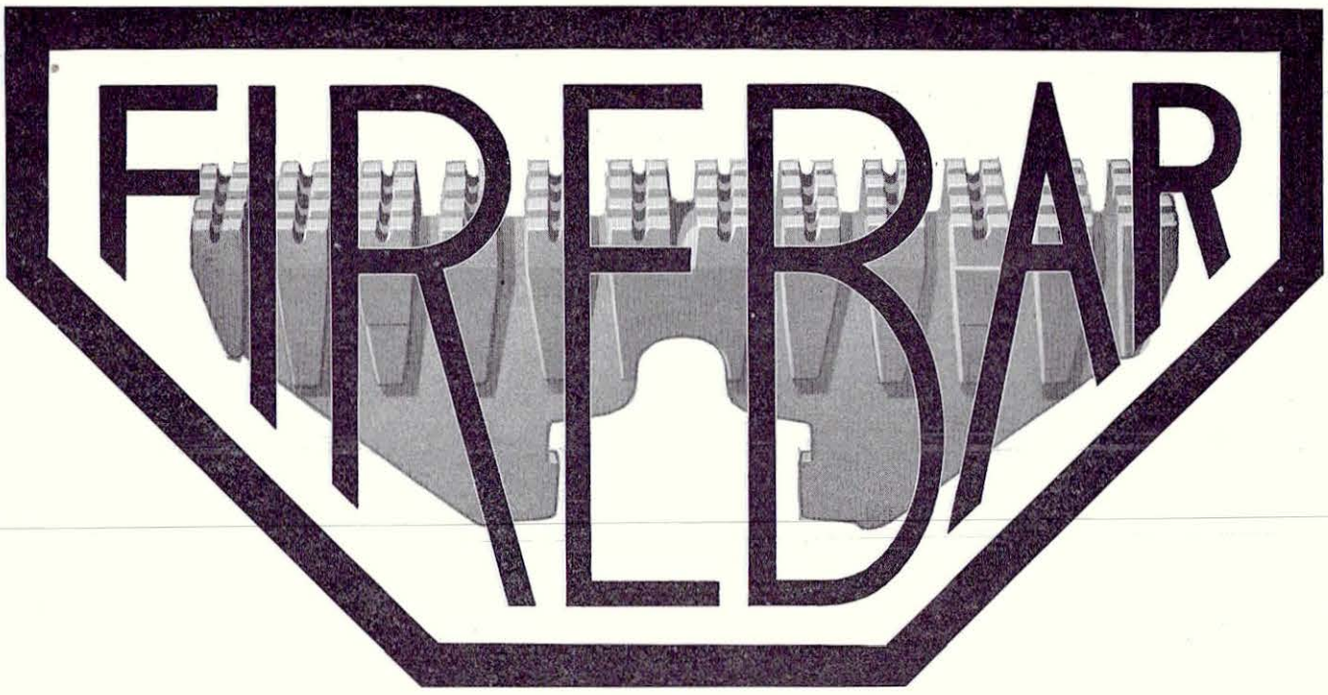


BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

feet of sidetrack, over which the Erie has been operating under trackage rights. It is proposed to pay $65,000 for the property.

FORT SMITH & WESTERN.—*Wants to Be Acquired by Missouri Pacific.*—This company has filed with the Interstate Commerce Commission a motion that it issue an order requiring the Missouri Pacific to make a bona fide reasonable offer to acquire the F. S. & W. at a reasonable price in compliance with the intent of the commission's report in the unification case in which it held that it would be in the public interest for the Missouri Pacific to lease 22 subsidiary properties on condition that it make offers to acquire certain short lines. No order was entered and the Missouri Pacific has not filed its acceptance of the condition.

NEW YORK CENTRAL.—*Reduces Dividend.*—Directors of this company meeting in New York on September 9 declared a quarterly dividend of $1.00 on the common stock, thus establishing a $4 annual rate. This rate compares with $6 established earlier this year after a reduction from the $8 rate previously paid. In addition all salaries above $500 a month are to be reduced by from 10 to 20 per cent effective October 1.

NEW YORK, NEW HAVEN & HARTFORD.—*Dividend Reduced.*—The directors of this company on September 8 voted a quarterly dividend of $1.00 a common share, thus reducing the annual rate to $4, as compared with the $6 previously paid. The directors at the same time voted to cut their fees in half and the higher officers of the company have voluntarily accepted a reduction of 10 per cent in their salaries.

OREGON-WASHINGTON. — *Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon that part of its Homestead branch extending from Robinette, Ore., to Homestead, 24.8 miles.

WABASH.—*Use of Lehigh Valley Stock As Collateral.*—The Interstate Commerce Commission has extended from December 31, 1931, to June 30, 1933, the date during which the Wabash is authorized to pledge and repledge 177,900 shares of common stock of the Lehigh Valley which it owns as collateral security for promissory notes.

Average Prices of Stocks and of Bonds

	Sept. 8	Last week	Last year
Average price of 20 representative railway stocks.	54.55	60.26	115.81
Average price of 20 representative railway bonds..	86.11	87.16	95.71

Dividends Declared

Belgian National Railways.—American Shares, Preferred, $4.12, payable September 22 to holders of record September 15.

New York, Lackawanna & Western.—1¼ per cent, quarterly, Payable October 1 to holders of record September 15.

New York, New Haven & Hartford.—Preferred, $1.75, quarterly, payable October 1 to holders of record September 25. Common, $1.00, quarterly, payable October 1 to holders of record September 18.

Rutland Railroad.—$2.00, payable October 15 to holders of record September 25.

St. Louis Rocky Mt. & Pacific.—Common, $.25, quarterly; Preferred, $1.25, quarterly, both payable September 30 to holders of record September 15.

Old Colony.—$1.75, quarterly, payable October 1 to holders of record September 12.

Railway Officers

Williams Succeeds Taussig as President of Wabash

J. E. Taussig, president of the Wabash and the Ann Arbor, has announced his retirement from active railroad service and has tendered his resignation as president of those two companies. The office of president of the Wabash and its subsidiaries will be combined with that of chairman of the board, William H. Williams, present chairman, succeeding Mr. Taussig as president and holding both positions. Mr. Taussig, who intends to devote his time to personal affairs, has been requested and has agreed for the present to give some of his time in an advisory capacity and to continue on the boards of the terminal companies in which the Wabash is interested.

EXECUTIVE

W. W. Owens has been appointed vice-president in charge of operations, Southern departments, of the Railway Express Agency, with headquarters at Atlanta, Ga., succeeding **William G. Smith,** who retired on August 17.

FINANCIAL, LEGAL AND ACCOUNTING

Charles F. Handshy, inspector of transportation of the Illinois Terminal, with headquarters at Springfield, Ill., has been appointed also freight claim agent, with headquarters at St. Louis, Mo. Mr. Handshy was born on October 19, 1864, in Madison County, Ill., and after a grade school education entered the service of the Wabash in November, 1882, as a telegraph operator. During the next five years, he was advanced successively through the positions of train dispatcher, chief train dispatcher and trainmaster, at the end of which time he went with the Illinois Traction System as general superintendent of transportation. He was later promoted to general superintendent and then to general manager, and when this road was consolidated with the Illinois Terminal he was appointed inspector of transportation. Mr. Handshy will occupy the position of freight claim agent in addition to that of inspector of transportation.

Charles F. Handshy

OPERATING

J. C. McPherson has been appointed superintendent of electric transportation of the Southern Pacific, with headquarters at Oakland Pier, Cal.

N. W. Jones, assistant superintendent of the New York division of the Reading, with headquarters at Philadelphia, Pa., retired on August 31, after 53 years of service, and **George N. Ewing** has been appointed to succeed him, as announced in the *Railway Age* of September 5, page 383.

William Egleston has been appointed general manager of the South Atlantic department of the Railway Express Agency, with headquarters at Washington, D. C., and **H. M. Smith,** has been appointed to succeed Mr. Egleston as general manager of the Gulf department, with headquarters at Atlanta, Ga.

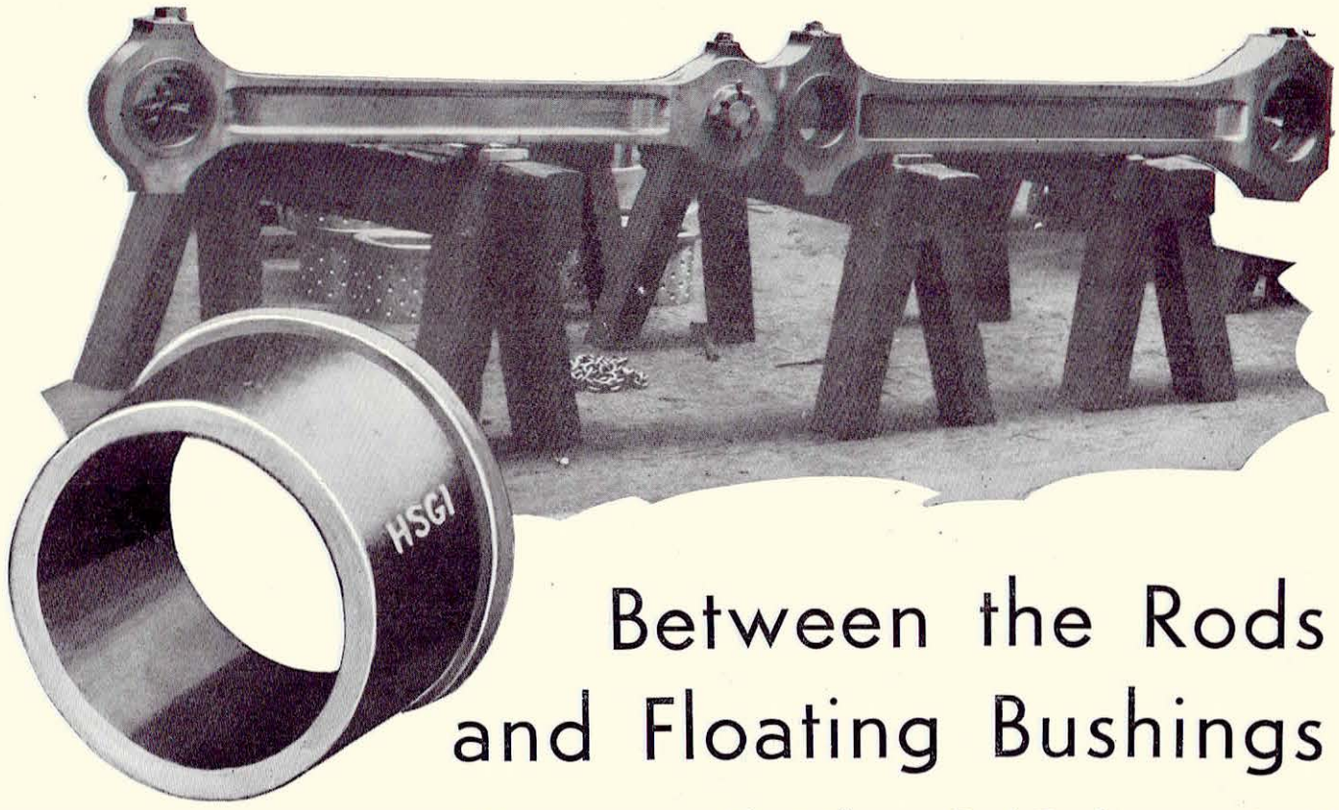
W. C. Myers, superintendent (electric) of the Illinois Terminal, with headquarters at St. Louis, Mo., has been appointed general superintendent of the St. Louis Electric Terminal Railway, the St. Louis & Alton and the McKinley Bridge Roadway (units of the Illinois Terminal), with the same headquarters.

Following the absorption of the Springfield division of the Wabash by the Western and Moberly divisions, **R. A. Messmore,** superintendent of the Springfield division, with headquarters at Springfield, Ill., has been appointed superintendent of the Moberly division, with headquarters at Moberly, Mo., to succeed **C. B. Davidson,** who has been assigned to other duties. **C. R. McGregor** has been appointed assistant superintendent of the Moberly division, with headquarters at Springfield. The Western division, of which **W. W. Greenland** is superintendent, with headquarters at Moberly, now extends from Kansas City, Mo., to St. Louis, and from Omaha, Neb., to Brunswick, Mo., but does not include the St. Louis and Kansas City Terminal divisions. The Moberly division now extends from Des Moines, Iowa, and Ottumwa, to Moberly, and from the latter point to Decatur, Ill., including all branches.

TRAFFIC

J. E. Weaver, chief clerk to the chief traffic officer of the Alton, has been promoted to assistant general passenger agent, with headquarters as before at Chicago.

Continued on Next Left Hand Page



Between the Rods and Floating Bushings

BE sure to specify *stationary* Rod Bushings made of HUNT-SPILLER *Air Furnace* GUN IRON.

Their tough, uniform, wear-resisting properties insure maximum service, greater mileage from floating bushings, fewer failures, less trouble with hot pins and lower maintenance costs.

Comparison of rod maintenance costs before and after application will quickly convince you that every bearing equipped with a floating bushing should be protected with a *stationary* Bushing made of HUNT SPILLER *Air Furnace* GUN IRON.

A test application will show the way to big savings.

HSGI
Reg. U. S. Trade Mark
Cylinder Bushings
Cylinder Packing Rings
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Crosshead Shoes
Hub Liners
Shoes and Wedges
Floating Rod Bushings
Parts Finished for Application
Dunbar Sectional Type Packing
Duplex Sectional Type Packing
(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

HUNT-SPILLER MFG. CORPORATION
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383 Dorchester Ave. South Boston, 27, Mass.
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H. H. Kiernan, assistant to the vice-president of the Chicago Great Western, has been appointed general traveling passenger agent, with headquarters as before at Chicago. The position of general traveling passenger agent had been vacant for some time prior to Mr. Kierman's appointment.

E. J. Meade, district passenger agent on the Illinois Central, with headquarters at Springfield, Ill., has been promoted to assistant general passenger agent, with headquarters at St. Louis, Mo., to succeed **George R. Kimbel,** who has been transferred to Memphis, Tenn. Mr. Kimbel succeeds **R. J. Carmichael,** who has retired.

S. G. Lutz, who has retired as chief traffic officer of the Alton, as noted in the *Railway Age* for August 29, has served in the traffic departments of a number of middle-western roads for 41 years. He was born at Maryland, Ill., and graduated from Western College, Toledo, Iowa, in 1887. Three years later he joined the traffic department of the Iowa Central (now part of the Minneapolis & St. Louis), and served in various clerical positions until 1894. From this date until 1904, he served successively as chief clerk in the freight traffic department and assistant general freight agent. In the latter year, Mr. Lutz went with the Minneapolis & St. Louis as assistant general freight agent at Peoria, Ill., being appointed freight traffic manager of this road and of the Iowa

S. G. Lutz

Central four years later. A year later, his jurisdiction was extended to include the Chicago & Alton (now the Alton), and the Toledo, St. Louis & Western (now part of the New York, Chicago & St. Louis). Following the dissolution of this system, he was from 1910 to 1914, traffic manager of the Minneapolis & St. Louis and the Iowa Central, at Minneapolis, Minn., being appointed general traffic manager of the Chicago & Alton on the latter date, with headquarters at Chicago. In 1917, he was advanced to vice-president in charge of traffic, and a year later was appointed traffic manager, under the federal manager, of the Chicago & Alton; the Chicago, Peoria & St. Louis; the Peoria & Pekin Union and the Peoria Railway Terminal. He was also a member of the Chicago Traffic Commission under the director general of railroads. Upon the return of the roads to their owners in 1920, Mr. Lutz returned to the Chicago & Alton as vice-president in charge of traffic, being appointed chief traffic officer in 1922, when the road went into receivership. He retained this position until his retirement effective August 24.

C. M. Teschemacher, assistant general freight agent of the Alton has been promoted to general freight agent, with headquarters as before at Chicago, to succeed **S. A. Williams,** who has been appointed freight traffic manager, as noted in the *Railway Age* of August 29. **W. H. Ogborn,** assistant to the freight traffic manager, with headquarters at Chicago, has been appointed assistant

C. M. Teschemacher

general freight agent at the same point, to succeed Mr. Teschemacher. **F. A. Malmberg,** commercial agent at Chicago, has been appointed general agent in the freight traffic department, in charge of solicitation in Chicago and surrounding territory, with office at 222 W. Adams street, succeeding **J. H. Walkmeyer,** whose headquarters have been transferred to 340 W. Harrison street. **J. L. Harris,** manager of perishable traffic, with headquarters at Chicago, has been appointed general Pacific Coast agent, in charge of the development of Pacific Coast traffic, with headquarters at Los Angeles, Cal.

Mr. Teschemacher has been with the Chicago & Alton (forerunner of the Alton), for 28 years. He entered the service of the Pennsylvania in 1895 as a bill clerk at Vincennes, Ind., and three years later went with the Cleveland Cincinnati, Chicago & St. Louis as a relief agent at Indianapolis. In 1900, he was transferred to Peoria, Ill., at which point he became an agent for the Chicago & Alton in 1903. In 1905, Mr. Teschemacher was transferred to Kansas City and seven years later he was sent to Chicago as general agent. He was appointed assistant general freight agent at Chicago in 1923, which position he held until his promotion to general freight agent, effective September 1.

MECHANICAL

S. C. Graham, master mechanic on the Chicago & North Western, with headquarters at Missouri Valley, Iowa, retired on September 1, with a record of nearly 50 years of service with that road.

OBITUARY

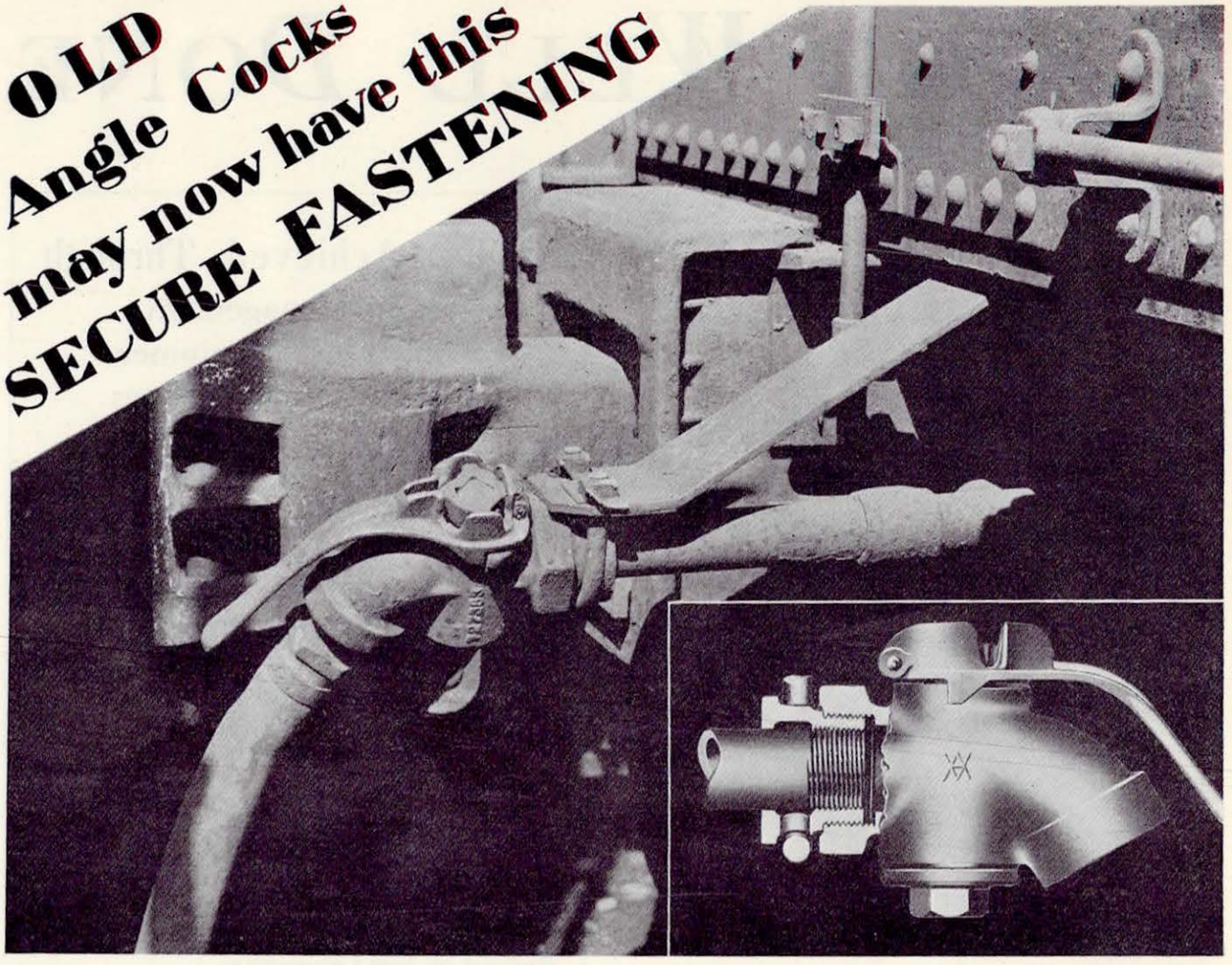
J. M. Connell, assistant passenger traffic manager of the Atchison, Topeka & Santa Fe, died on September 7, after a brief illness. He was born in Chicago, Ill., on June 3, 1863, and commenced his railroad career in 1879, as clerk in the freight department of the Chicago, Burlington & Quincy. During 1881 and 1882 he served as a clerk and a stenographer with the Northwestern Traffic Association, where he remained until 1883, when he became a clerk on the Santa Fe at Chicago. From 1884 to 1905, Mr. Connell was successively freight and passenger agent at Milwaukee, Wis., city passenger agent and general agent of the passenger department at Chicago. On October 1, 1905, he was promoted to general passenger agent, with headquarters at Topeka. His promotion to assistant passenger traffic manager became effective on October 1, 1929, the position he held until his death.

* * * *

An Addition to Henry Ford's Collection

Narrow-gage locomotive of 1892 recently presented to Mr. Ford by Thomas A. Edison. First used in the Edison iron mines at Sparta, N. J., and later at the Portland Cement Works at New Village, N. J.

OLD Angle Cocks may now have this SECURE FASTENING



OUR improved angle cock having U bolt extension—now supplied with all new complete air brake equipments—permits such secure fastening as to prevent the cock turning or shifting its position, and support the pipe firmly back of the threaded joint.

Old angle cocks may have this feature added to them by inserting the bushing shown in the illustration . . . We suggest that all old standard angle cocks be converted by adding the bushing so as to obtain the recognized advantages of secure fastening—Complete information may be obtained by writing our nearest district office.

WESTINGHOUSE AIR BRAKE COMPANY

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A JOB WELL DONE

is reflected in the remarkable results accomplished by American railroads during the past decade.

Although gross revenues have *decreased* 7 per cent during this time, net railway operating income has increased 41 per cent. This has been the result of increased efficiency all along the line—good management — improved equipment — and the larger proportion of modern power in service. It is a job WELL DONE.

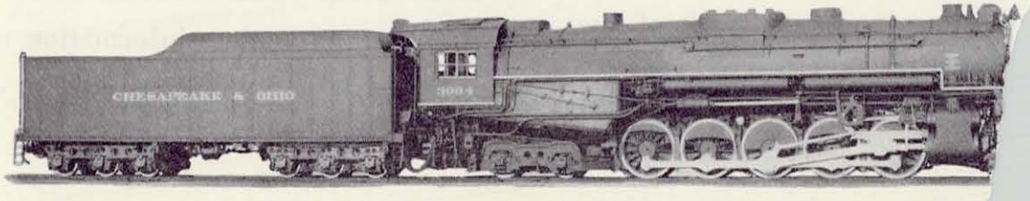
While today locomotives are more powerful, freight trains are longer and travel at higher speeds, yet fuel consumption has decreased from 160 pounds of coal per 1000

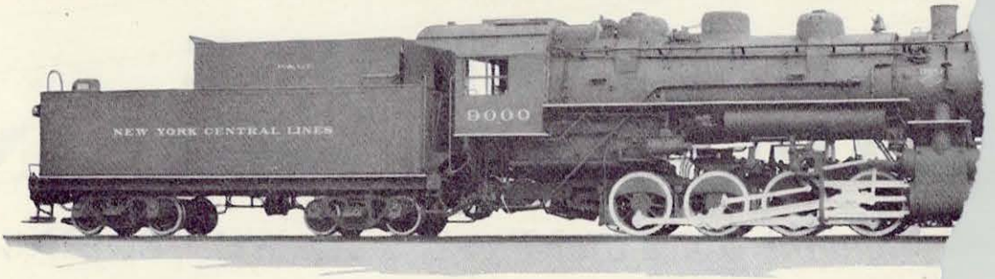
Results Achieved Through
—Good Management
—Improved Equipment
—Modern Locomotives

	1921	1930
Number of Serviceable Locomotives	64,585	54,900*
Average Tractive Effort	36,935	45,010
Number of Miles Average Freight Car Moves per day	22.4	28.7
Average Number of Tons of Freight Carried per car	389	469
Average Train Load (Tons of Freight)	651	785
Average Number of Cars per Train	38	45.8
Average Number of Tons of Freight Carried One Mile in One Hour	7,525	10,839
Number of Locomotives Retired During this Period	25,831*	
Number of New Locomotives During this Period	17,061*	

*—Approximate

[Modern locomotives that are helping to build up efficiency rec... ords.]





gross ton miles in 1921 to 121 pounds in 1930—or by 24 per cent.

This has been due in large measure to the use of modern locomotives equipped with fuel-saving and capacity-increasing devices such as Elesco superheaters and Elesco feed water heaters. Quality and service are paramount in transportation as elsewhere.

Still greater economies may be realized by the railroads through application of more of these devices and retiring older power without them. For new power there are Elesco type "E" superheaters—incorporating the latest improvements of construction to meet modern requirements. Also Elesco feed water heaters are available to add at least 15 per cent additional capacity to new power or the best of the older superheater power.

Another Elesco development available for continuous and proper performance of superheater power is the Elesco Unit Remanufacturing Service — whereby unserviceable units are completely rehabilitated equal to new units—and the superheater is enabled to perform at full efficiency as long as it is in service.

Through these well proven devices and unequaled service, Elesco is prepared to help railroad management attain still better operating results.

THE SUPERHEATER COMPANY

60 East 42nd Street
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Peoples Gas Building
CHICAGO

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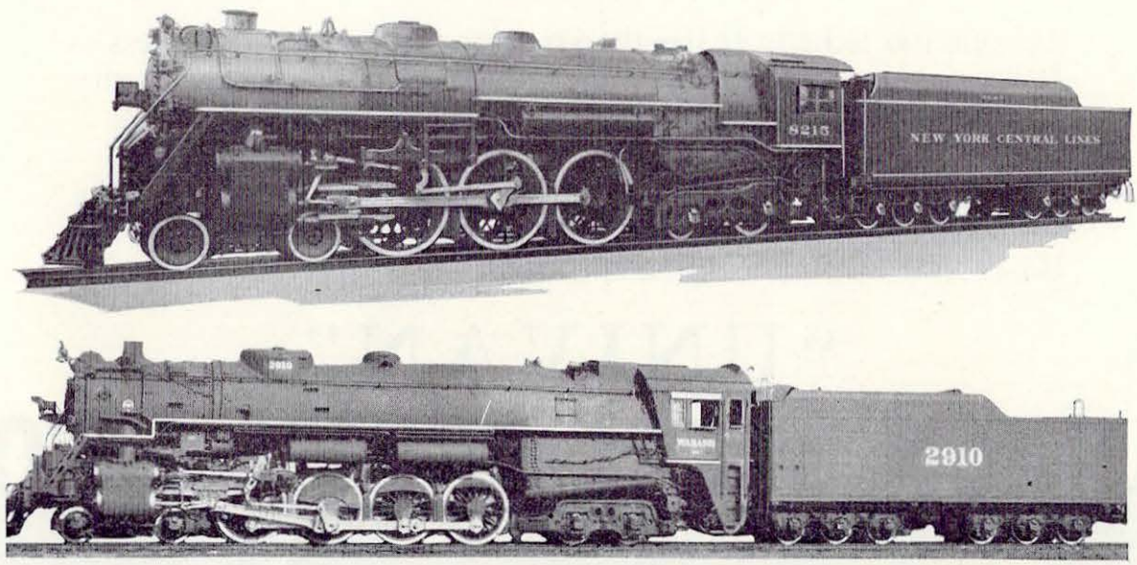
SUPERHEATERS EXHAUST STEAM INJECTORS FEED WATER HEATERS
SUPERHEATED STEAM PYROMETERS

A-635



DO WHEEL CENTERS LOOM BIG
IN YOUR MAINTENANCE OF EQUIPMENT COSTS

"UNIVAN"
THAT TOUGH STEEL

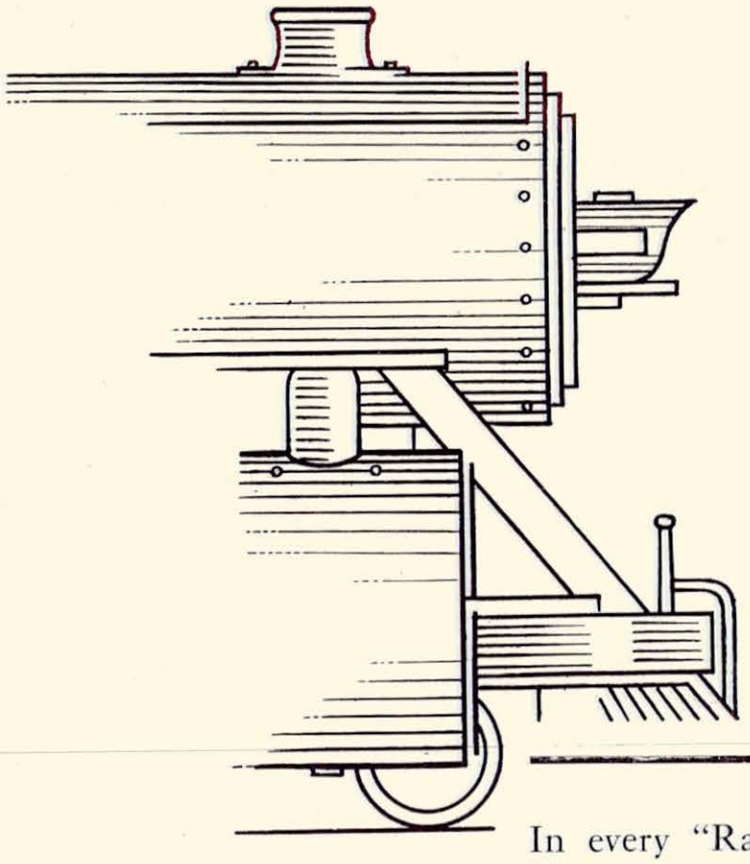
has this job licked. It has the strength—It has the toughness—It has great resistance to fatigue. Why not have the security and safety ***Univan*** gives?

UNIVAN Steel is also strongly recommended for Engine Frames, Crossheads, Crosshead Guides, Guide Yokes, Driving Boxes and Spring Saddles. For long life with economy specify

"UNIVAN"

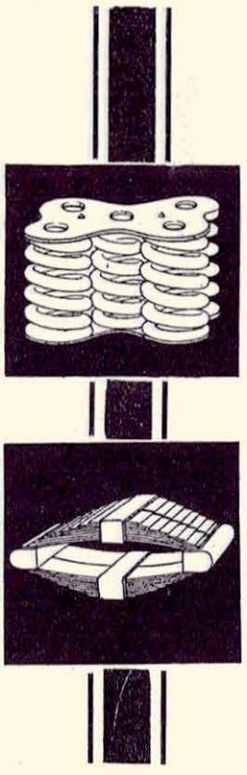
UNION STEEL CASTING CO.

PITTSBURGH, PA.



A PROMISE OF PERFORMANCE

In every "Railway Steel Spring" product, whether it be tires, wheels, or springs, is that "quality" which has been proved by the test of time. For "Railway Steel Spring" products combine not only the highest quality of materials, the use of the most modern machinery and the best of workmanship, but also the result of long years of practical railroad experience.



Railway Steel-Spring Company

30 CHURCH ST., NEW YORK

Branch Offices:

Chicago, Ill.	Detroit, Mich.	St. Louis, Mo.	Pittsburgh, Pa.	Montreal, Que.
St. Paul, Minn.	Washington, D. C.	Cleveland, Ohio	Denver, Colo.	San Francisco, Cal.

"In my 30 years of railroading I think the adoption of roller bearings as applied to your No. 1111 is the greatest improvement ever put on a locomotive"

.....Engineer, Nickel Plate Road

The engineers who have handled the Timken locomotive during its 75,000 miles of trouble-free service on 11 railroads are enthusiastic in their praise of the smoothness of operation, increased power effect, dependability and ease of control which Timken Bearings have made possible.

This enthusiasm is interestingly expressed in the following letter received from a Nickel Plate engineer:

> Gentlemen: On July 11th I had the pleasure of handling your engine No. 1111, and when I say "pleasure" I mean it. As compared with some engines I have ridden, it is as a Pullman to a box car. And it is some engine—in fact too much so.
>
> She is certainly a powerful machine, nice to handle from an engineer's viewpoint, and certainly an easy job for a fireman.
>
> I do not think that locomotives will be built much larger than at present; in fact, I think that railroad executives will go back to smaller power with all the latest improvements for better and faster service to the public, and in my 30 years of railroading I think the adoption of roller bearings as applied to your No. 1111 is the greatest improvement ever put on a locomotive.
>
> Yours truly,
>
> .....Engineer,
> Nickel Plate Road.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* BEARINGS

THE YANKEE CLIPPER

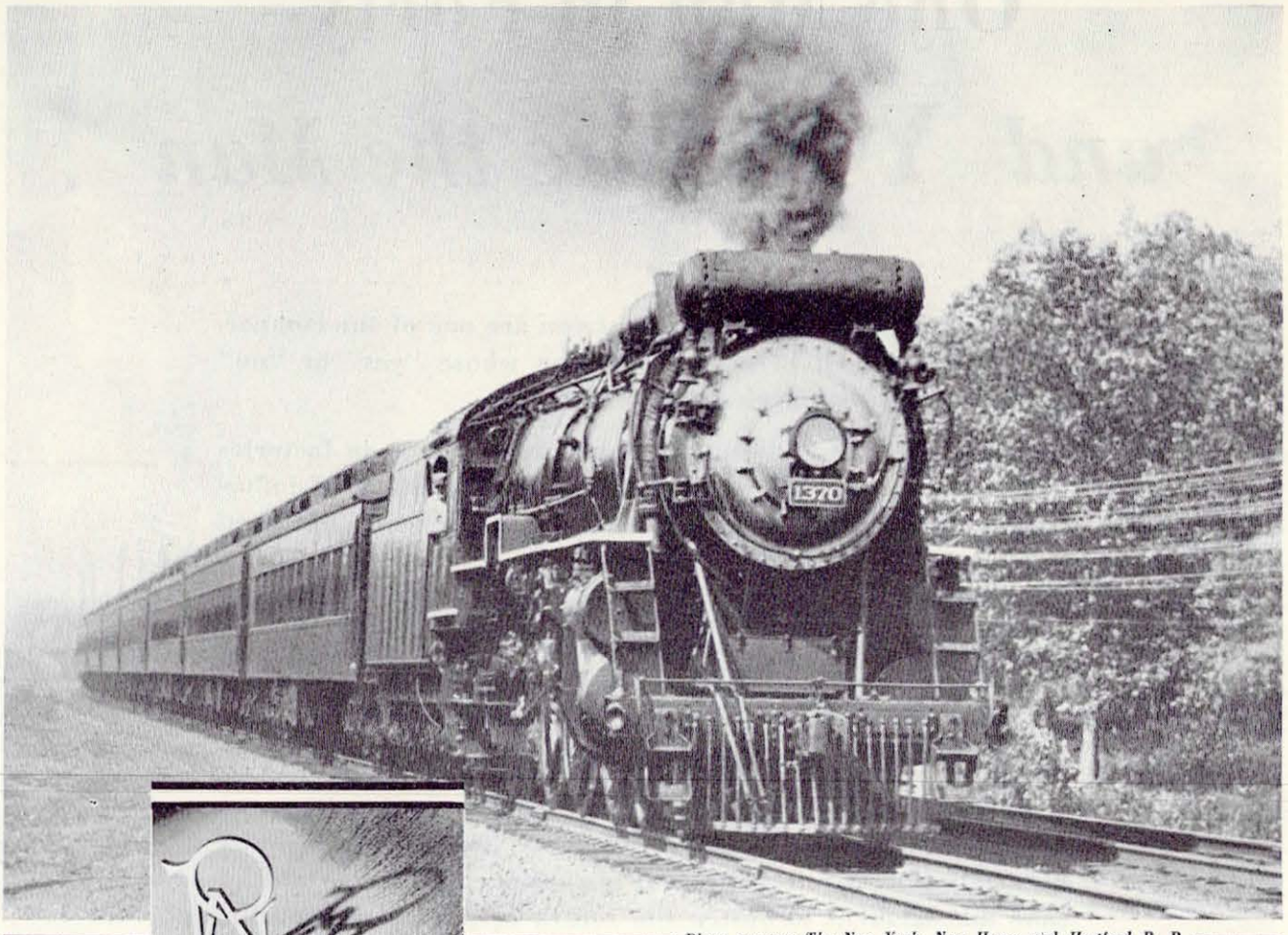


Photo courtesy The New York, New Haven and Hartford R. R.

HIGH speed luxury — the Aristocrat of Trains — that's the Yankee Clipper, one of the famous trains of the New Haven Railroad equipped with Pyle-National headlights and turbo-generators. In fact, so are a great majority of all railroads. Write for special bulletins describing the complete line of Pyle-National electrical products.

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RA-9-12-Gray

One Man in Forty—

and YOU *are the Man*

DID you ever stop to think that *you* are one of the comparatively small percentage of men whose "yes" or "no" really matters to American business?

Every morning 40,000,000 men start to work—in factories and mines, banks, railways, stores and other centers of industry or trade. Forty million men turn the wheels that keep America clothed, sheltered and fed.

But only one million of them make business decisions. Only one man in forty has the ability, the responsibility or the authority to say yes or no in business matters. Hence the *real* managing power of the country lies in the hands of these million men—less than one per cent of its total population.

As a member of this group—this controlling minority—you share an important responsibility—the triple responsibility of wisely liberal purchasing, of generous employment and of sane management to hasten the return of general prosperity.

• • •

How, you ask, do we know that *you* are one of the million who make decisions for others to follow? Because men who read business papers are alert and eager for news of new plans, new methods, new equipment. That is *why* they are the men who control affairs.

ABP

THIS SYMBOL *identifies an ABP paper . . . It stands for honest, known, paid circulation; straightforward business methods, and editorial standards that assure reader interest . . . These are the factors that make a valuable advertising medium.*

RAILWAY AGE IS A MEMBER OF

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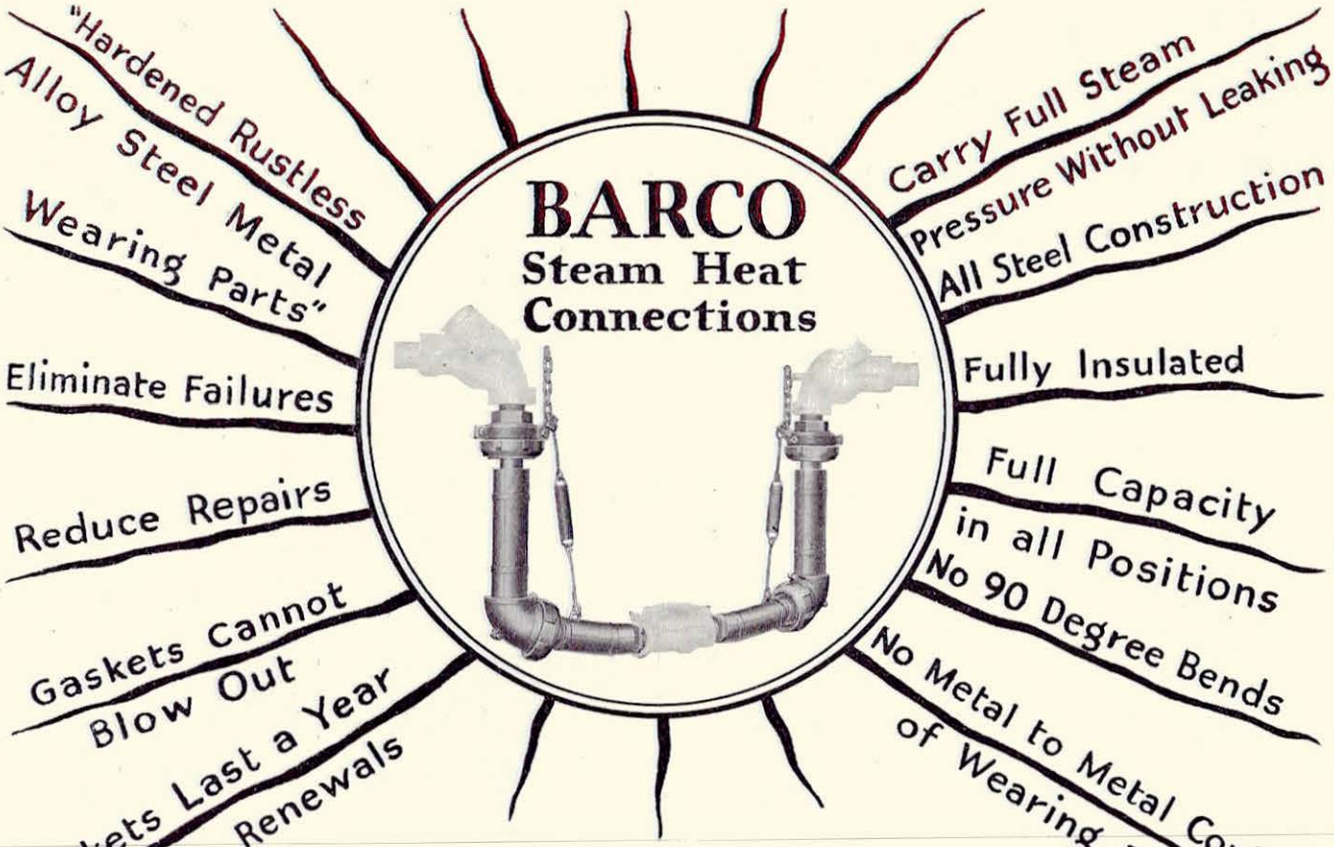

ONLY THE SUN

Can Heat Your Coaches For A Lower Cost

IN other words when you have to resort to the use of steam to keep your coaches comfortable, no other methods of transmission between the cars and locomotive will assure greater efficiency and economy than BARCO Steam Heat Connections.

Note all the advantages listed at the top of this page. Do you wonder that 38 leading railroads are using BARCO Steam Heat Connections?

Why go through another steam heating season with those periodic failures and annoying complaints from passengers?

Now is the time to replace troublesome and expensive steam hose with cost saving BARCO Steam Heat Connections.

Barco Manufacturing Co.

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BARCO

DeVilbiss

Headquarters for Spray-Painting and Finishing Equipment for the Railway Industry

Under today's highly competitive conditions and the struggle for public patronage, railway executives realize the advertising value of attractive rolling stock and well maintained stations and structures. That is the reason for the constantly increasing use of DeVilbiss Spray-painting and Spray-finishing Equipment by the railroads.

Because spray-painting is faster and more economical, upkeep operations can be more frequent and maintenance cost can be kept down. Thus, DeVilbiss Equipment enables railroads to keep "up to the minute" in appearance without increasing expenses.

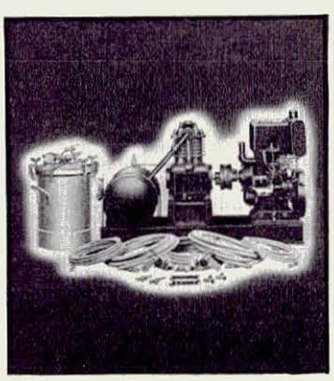
You can spray-paint or spray-finish everything from a seat bracket to the rotunda of a waiting room in a big terminal. Call in your local DeVilbiss representative. Or write.

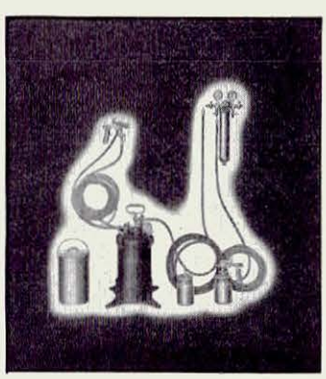
THE DEVILBISS COMPANY . TOLEDO, OHIO

NEW YORK PHILADELPHIA CLEVELAND DETROIT INDIANAPOLIS CHICAGO ST. LOUIS LOS ANGELES SAN FRANCISCO WINDSOR, ONTARIO

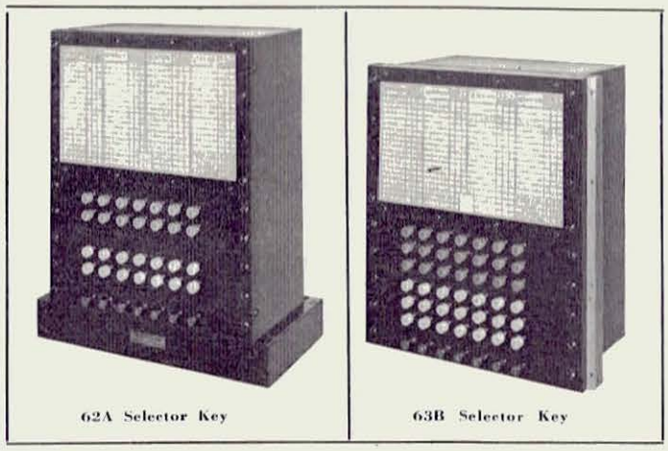
Direct sales and service representatives available everywhere

The wide DeVilbiss Line embraces every outfit and accessory for spray-painting and spray-finishing





New Developments in Telephone Train Dispatching



62A Selector Key

63B Selector Key

*1 *Improved* COMPACT selector key

The compactness, ease of operation, and simplified maintenance of these new Western Electric motor-driven Selector Keys will appeal to train dispatchers everywhere as an outstanding development in calling equipment.

The small size of the key—12½ inches high, 10¼ inches wide, and 6½ inches deep—should prove particularly valuable in crowded dispatching rooms. Seventy-eight or two hundred forty-one different selectors may be called, depending on the capacity of the key.

Instead of using a separate key to call each selector, as in the past, every selector in the new unit may be called by pressing simple combinations of two keys on the face of the cabinet. Large numbers of selectors are thus made available in the same space. Operation is simple and quick.

The key is made in two types, suitable for mounting either on a desk or in a PBX Switchboard. Each type may be had in two capacities.

The high quality of this apparatus is indicated by the reputation of the maker, Western Electric. In addition, the flexibility, simple maintenance, and compactness of the new Selector Key (all parts of the mechanism are contained within the housing) should make it especially desirable for railroad use.

For further information on Western Electric Selector Keys, or on any other Western Electric Train Dispatching equipment, write the distributor, the Graybar Electric Company.

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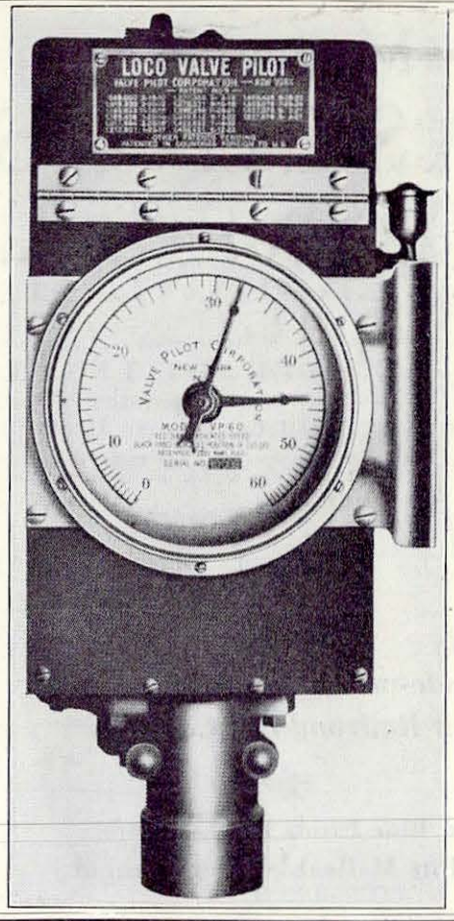
OFFICES IN 76 PRINCIPAL CITIES
EXECUTIVE OFFICES: GRAYBAR BUILDING, NEW YORK, N. Y.

**Note: This is one of a series of advertisements dealing with the latest developments in telephone train dispatching. Watch for subsequent advertisements. Or, better yet, send your name to be put on the mailing list for the series.*



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Enables the locomotive engineman at will to develop maximum drawbar pull or maximum fuel economy.

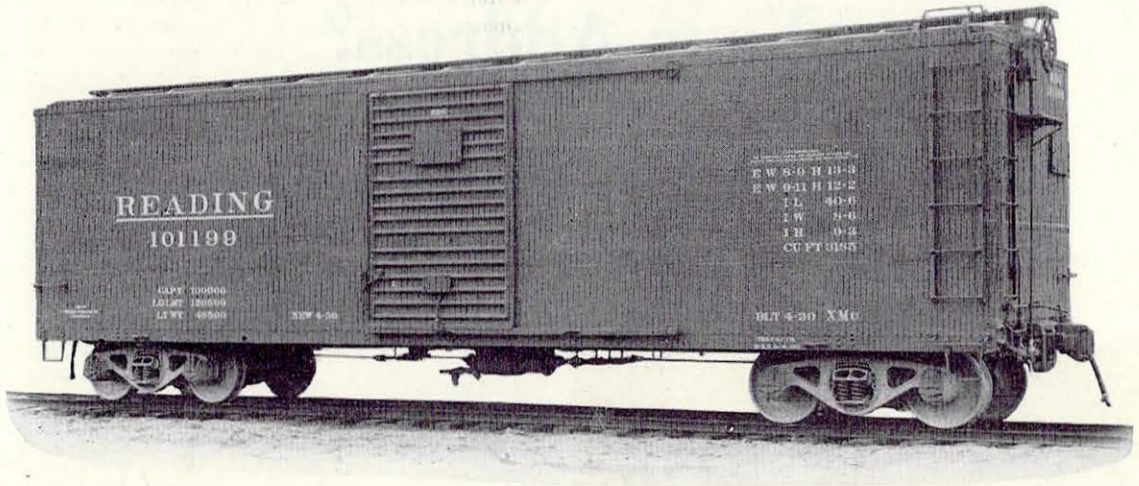
The tape record gives tangible evidence of the excellence of performance, of shorter running time and of large operating economies.

VALVE PILOT CORPORATION

230 Park Avenue, New York, N. Y.

PRESSED STEEL CAR COMPANY

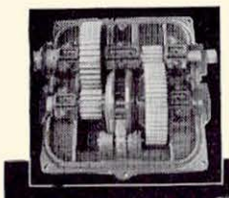
Pioneer Builders of Steel Freight and Passenger Cars



Steel Underframes — Cast Steel Bolsters and Truck Side Frames — Malleable and Steel Castings — Pressed Parts — Chilled Tread Wheels — Forgings

NEW YORK PITTSBURGH CHICAGO ST. LOUIS ST. PAUL

3



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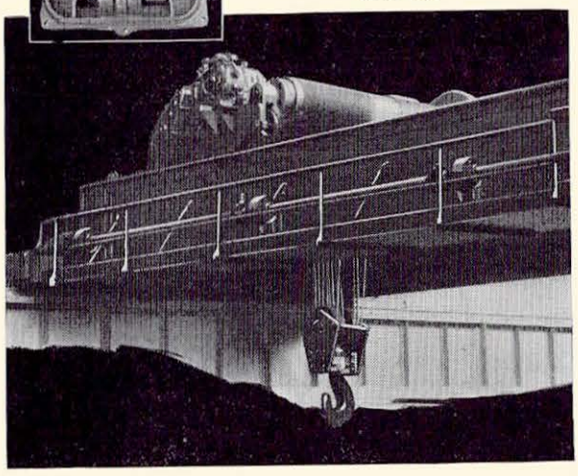
WRITE FOR BULLETINS No. 100 AND 101



Niles Compact reduction-gear and load-brake trolley design features all Niles Cranes. It provides perfect lubrication and lasting alignment.

NILES CRANE

DIVISION OF
SHEPARD NILES CRANE & HOIST CORPORATION
434 Schuyler Ave., Montour Falls, New York

Malleable CASTINGS

of Uniform Quality ARE PERMANENT

F T P

Current AVERAGE TESTS for 12 months 910 Consecutive Heats

	Tensile Strength Lb. per sq. in.	Yield Point Lb. per sq. in.	Elong. % in 2 in.
HIGH	61370	40420	28.1
LOW	56490	37210	22.6
AVERAGE	58344	38494	25.9

This Trade-mark is your security on Railroad Car Castings

Send Blue Prints for Estimates

Fort Pitt Malleable Iron Company
PITTSBURGH, PA.

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Notice of change of address of subscribers should reach the office of Railway Age, 30 Church St., New York, ten days in advance to insure delivery of the following issue to new address. In sending notification of change always include the old address as well as the new.

Name ..... **Old Address** .....

New Address .....

..... **Position** ..... **Company** .....

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(INCORPORATED)

Journal Bearings

AND

Bronze Engine Castings

New York Chicago

The Sign Of

Security and MULE-HIDE ROOFS "NOT A NICK IN A MILLION FEET" **Satisfaction**

This Is The Season Of The Year That Mechanical and Engineering Departments Of Leading Transportation and Industrial Concerns Turn To Mule-Hide —Regardless Whether It's Shop Roofs— Cab Curtains Or Any Of The Needed Asphalt Repair Materials—The Proper Kind For Every Need Is Found In The Guaranteed Mule-Hide Line — For A Quarter Of A Century A Recognized Leader.

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44th to 45th St. on Oakley Ave.
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A.R.A. Standard "D" Couplers

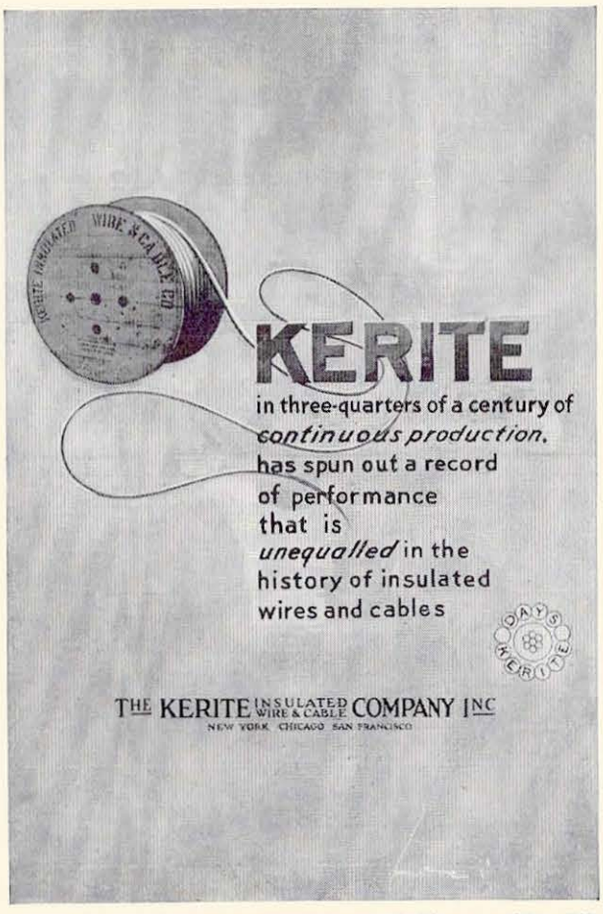
Pitt Couplers
Penn Couplers
for Cars and Locomotives

Pitt Pivoted and "D" Couplers

designed especially for Passenger Train Cars

The McConway & Torley Company

48th St. & A. V. Ry., Arsenal Station
Pittsburgh, Pa.



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Freight Car Door Fixtures
Corrugated Steel Freight Car Doors
CAMEL SALES COMPANY 332 South Michigan Avenue CHICAGO, ILLINOIS

"TIGER" BRONZE
ENGINE CASTINGS
STRONG TOUGH
ANTI-FRICTIONAL EASILY MACHINED
NATIONAL BEARING METALS CORP.
ST. LOUIS, MO.
New York, N. Y. Jersey City, N. J. Pittsburgh, Pa. Meadville, Pa. Portsmouth, Va. St. Paul, Minn.
3

CAR HEATING
Full 2-inch Steam area
No steam-hose Renewals
Low Maintenance
2-inch End Valves
2-inch Metallic Conduits
2-inch Couplers
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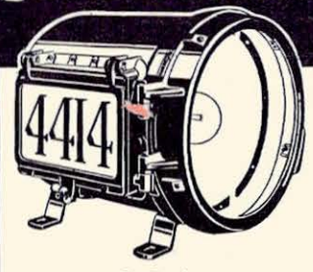
Railway Exchange Chicago

BARBER
LATERAL-MOTION DEVICE
1,300,000 cars in service on over 60 Railroads and Car Lines
ROLLER SIDE-BEARINGS
Reduces Friction on Rails 15%
Lessens Wheel Flange Wear
STANDARD CAR TRUCK CO.
McCORMICK BUILDING CHICAGO

SUNBEAM HEADLIGHTS WILL OUTLAST the LOCOMOTIVE -


Rust-Proof Headlight No. 4414
STURDILY constructed of Rust Proof Steel, Sunbeam Headlights are built for permanent dependability. They will resist wear and tear longer than the locomotive to which they are applied. Available in 12 inch and 14-inch sizes, with glass reflectors, Sunbeam Headlights afford low-cost lighting service, because they need never be replaced
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COLUMBUS, OHIO
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Truck Bolsters
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Draft Yokes
"D" Couplers
Major Couplers
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is maintained for those
who have used
equipment to sell.

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Elliptic Springs, Journal Box Lids
Kensington (All Steel) Journal Box
WORKS: New Kensington, Pa.
PITTSBURGH OFFICE: 2001 Clark Building

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Asbestos and Rubber Packings for Railroad Use. Asbestos Insulating Materials
UNION ASBESTOS & RUBBER CO.
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THE P & M CO.
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Montreal London Paris Calcutta Sydney

Hollow Iron Bars up to 14 ft. long—Solid to 18 ft. Hollow or solid Stays, plain, headed, or headed and threaded.

"V" Pilot and Pilot Fibrous Packings . . . . For Every LOCOMOTIVE AND SHOP Service
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Our tests determine the best type of shoe for each type of service
The American Brake Shoe & Foundry Co.
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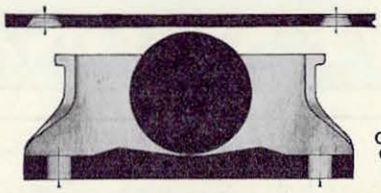
Refer to the Classified
Section on page 56

TIE PLATES
Track Appliances
Highway Crossing Signals
Signal Accessories
THE RAILROAD SUPPLY COMPANY
CHICAGO NEW YORK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Manufactured by
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Gives Complete Ballast Protection
WESTERN WHEELED SCRAPER CO.
Builders of Air Dump Cars
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CHAIN — LOGAN IRON & STEEL CO. — RIVET
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AUXILIARY SUPPORTS FOR BRAKE BEAMS
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A QUALITY PRODUCT
RESULT OF 40 YEARS EXPERIENCE
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FLEXOLITH
CAR FLOORING
TUCO PRODUCTS CORP.
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Quality and Workmanship Guaranteed
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SEND for Free Special Bulletin and learn how to increase your knowledge of practical railroad work and fit yourself for promotion. The Railway Educational Bureau, Omaha, Neb.

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Frank Parker, Pres.
Specializing in
FREIGHT & TANK CARS
RAILWAY EQUIPMENT
CAR PARTS
IRON & STEEL
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Send us your inquiries

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Your classified advertisement should appear in this section.

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30—12-yd. Western Air or Hand Dump Cars
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Also Relaying Rails of all weights, and Steel Sheet Piling.

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New and Relaying — Frogs — Tie Plates — Angle Bars—Cars of all types including Tank Cars, Hart Cars, Flat Cars, Box Cars—Railway Equipment—Used Car Parts—Steel Sheet Piling, both new and used.
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For location of advertisements in this issue of manufacturers listed in the Buyers Index, see Advertisers I ndex on the last page next to cover

BUYERS INDEX

Accounting Machines.
Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Air Brakes.
New York Air Brake Co.
Westinghouse Air Brake Co.

Aircraft Corrugated Sheet.
Aluminum Co. of America.

Aircraft Extruded & Rolled Shapes.
Aluminum Co. of America.

Aircraft Plates.
Aluminum Co. of America.

Aircraft Screw Machine Products.
Aluminum Co. of America.

Aircraft Streamline & Round Tubing.
Aluminum Co. of America.

Air Lifts.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
New York Air Brake Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Ash Conveyors.
Industrial Brownhoist Corp.

Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

Axles, Motor Trucks.
Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
Westinghouse Elec. & Mfg. Co.

Baggage Door Controller Device.
Edwards Co., O. M.

Barges, Steel.
American Bridge Co.

Barges, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Bars, Concrete, Reinforcing.
Carnegie Steel Co.
Central Alloy Steel Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

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Armco Railroad Sales Co.
Carnegie Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Illinois Steel Co.
Inland Steel Company.
Lockhart Iron & Steel Co.
McConway & Torley Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Bars, Rolled Steel.
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Batteries, Lighting.
Electric Storage Battery Co.

Batteries, Starting.
Electric Storage Battery Co.

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Electric Storage Battery Co.
Railroad Supply Co.
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S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
Miner, W. H.
Pressed Steel Car Co.
Symington Co., The.

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Fafnir Bearing Co.
Magnus Co., Inc.
National Bearing Metals Corp.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Journal Roller.
Fafnir Bearing Co.
S. K. F. Industries, Inc.
Timken Roller Bearing Co., The.

Bearings, Roller.
American Steel Foundries Co.
Fafnir Bearing Co.
Hyatt Roller Bearing Co.
Miner, W. H.
Shafer Bearing Corp.
S. K. F. Industries, Inc.
Standard Car Truck Co.
Stucki Co., A.
Timken Roller Bearing Co.
Wine Railway Appliance Co.

Bearings, Roller Side.
Q. & C. Company, The.
Standard Coupler Co.
Stucki Co., A.

Bearings, Side.
American Steel Foundries.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
Standard Car Truck Co.
Stucki Co., A.
Wine Railway Appliance Co.

Beds, Cast Steel, Locomotive.
General Steel Castings Corp.

Bell Ringer, Locomotive.
Ardco Mfg. Co.
Prime Mfg. Co., The.

Bells, Highway Crossing.
Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

Bending and Straightening Machines.
Ryerson & Son, Jos. T.
Sellers & Co. Inc., Wm.

Billets, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
McConway & Torley Co.
Midvale Co., The.
Ryerson & Son, Jos. T.
Republic Steel Corp.
Standard Steel Works Co.

Blocks, Chain.
Barco Mfg. Co.

Blocks, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Blooms, Steel.
Carnegie Steel Co.
Republic Steel Corp.

Blower Fittings, Automatic Smokebox.
Barco Mfg. Co.

Blowers, Turbo.
Ingersoll-Rand Co.

Blowtorches, Acetylene.
Oxweld Railroad Service Co., The.

Boiler (all types).
Baldwin Locomotive Works, The.

Boiler Checks.
Prime Manufacturing Co., The.

Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

Bolsters, Steel.
American Steel Foundries.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
Mt. Vernon Car Mfg. Co.
Ohio Steel Foundry Co., The
Pressed Steel Car Co.
Symington & Son, Inc., T. H.

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Baldwin Locomotive Works, The
Bethlehem Steel Co.
Buffalo Brake Beam Co.
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Ryerson & Son, Joseph T.
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Bolts & Nuts, Monel Metal.
International Nickel Co., The.

Bolts, Patch.
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Bolts, Track.
Illinois Steel Co.
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Bonders, Rail.
Q & C Co., The.

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P & M Co., The.

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Franklin Railway Supply Co., Inc.

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Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Boring Machines, Car Wheel
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Horizontal.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Vertical.
Sellers & Co., Inc., Wm.

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Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
Q & C Co., The.
Ramapo Ajax Co.
Symington Co., The.

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Brill Co., The J. G.
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National Malleable & Steel Castings Co.
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American Car & Foundry Motors Co.
Hunt-Spiller Mfg. Corp.

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Buffalo Brake Beam Co.
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American Brake Shoe & Foundry Co.
American Steel Foundries.
Brill Co., The J. G.
Buckeye Steel Castings Co.
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New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Clasp.
American Steel Foundries.

Brakes, Electric.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Hand.
Miner, W. H.
National Brake Co.
National Malleable & Steel Castings Co.
Wine Railway Appliance Co.

Brass, Sash.
Edwards Co., O. M.

Brick, Locomotive Arch.
American Arch Co., Inc.

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American Bridge Co.
Bethlehem Steel Co.

Bridge & Crossing Planks, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Flooring.
Carey Co., The, Philip.

Bridge Material, Treated.
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International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Stringers — (See Stringers, Bridge).

Bronze Powder, Aluminum.
Aluminum Co. of America.

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Industrial Brownhoist Corp.
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American Bridge Co.
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Milwaukee Electric Crane & Hoist Corp.
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Edgewater Steel Co.
Miner, W. H.
Standard Coupler Co.
Westinghouse Air Brake Co.

Buffers, Radial.
Franklin Railway Supply Co., Inc.

Building Materials.
Carey & Co., Philip, The.
Johns-Manville Corp.

Buildings, Iron, Steel and Steel Concrete.
American Bridge Co.
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Bushings, Driving & Engine Truck Boxes.
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American Steel & Wire Co.
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General Electric Co.
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Prime Mfg. Co., The.

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Oxweld Railroad Service Co.

Car Insulation.
Carey & Co., Philip, The.
Wood Conversion Co.

Car Lighting Equipment—(See Lighting, Car Equipment).

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

Car Repairs.
General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
Tennessee Coal, Iron & Railroad Co.

Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding — (See Siding, Car, etc.).

Cars, Baggage.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Cars, Ballast.
Bethlehem Steel Co.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock.
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
Bethlehem Steel Co.
Bettendorf Co., The.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Bettendorf Co., The.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

Cars, Freight (New and Repaired).
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Brill Co., The J. G.
Electro-Motive Co.
St. Louis Car Co.

Cars, Gasoline Motor.
Brill Co., The J. G.

Cars, Hand & Push.
Fairbanks-Morse & Co.

Cars, Industrial.
Bethlehem Steel Co.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Motor.
Fairbanks-Morse & Co.

Cars, Motor Inspection.
Fairbanks-Morse & Co.

Cars, Oil Electric.
Westinghouse Elec. & Mfg. Co.

Cars, Ore.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Passenger.
Bethlehem Steel Co.
Brill Co., The J. G.
Electro-Motive Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Cars, Power Units.
Brill Co., The J. G.
Electro-Motive Co.

Cars, Quarry.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Refrigerator.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro-Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Co.
General American Tank Car Corp.
Indian Refining Co.
Pressed Steel Car Co.

Cars, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co. The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co. The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
Q. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co. The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
New York Air Brake Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America

Conveyor, Ash—(See Coal Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries
Buckeye Steel Castings Co
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The
McConway & Torley Co
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co

Cranes, Barge.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp
Orton Crane & Shovel Co

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp
Orton Crane & Shovel Co

Cranes, Diesel.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co

Cranes, Electric Traveling.
Industrial Brownhoist Corp
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co
Orton Crane & Shovel Co

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Electric Railweld Service Corp.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.
Locomotive Finished Material Co.
Union Steel Casting Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co. The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mtrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic. Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Coffin, Jr., Co., The J. S.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries
Baldwin Locomotive Works. The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
JohnsManville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The.

Jacking Method of Installing Pipe
Armco Culvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns-Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm.

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D. The.

Locomotives, Rebuilt.
American Locomotive Co.

Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotive Stokers.
Standard Stoker Co.

Locomotive Valve Pilot.
Valve Pilot Co.

Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.

Lubricators, Piston Rod.
Q & C Co., The.

Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.

Machine Screws, Monel Metal
International Nickel Co., The.

Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.

Mechanical Draft Apparatus—(See Heating and Vent. App.).

Mechanical Stokers.
Standard Stoker Co.

Melters, Snow, Electric.
Q & C Co., The.

Metallic Flexible Conduit.
General Electric Supply Corp.

Meters, Water & Oil.
Worthington Pump & Machinery Corp.

Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.

Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.

Milling Machines, Portable Frame Jaw.
Micro Machine Co.

Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Molybdenum Metal.
Vanadium Corp. of America.

Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.

Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Motors & Generators.
Fairbanks-Morse & Co.

Moulding.
Aluminum Co. of America.

Multiple V Belt Drives.
Worthington Pump & Machinery Corp.

Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Nipples, Air Hose.
Prime Manufacturing Co.

Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.

Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.

Nuts—(See Bolts and Nuts).

Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.

Nuts, Tank Hose.
Prime Manufacturing Co., The.

Office Appliances.
Remington-Rand Business Service.

Oils, Diesel Engine
Vacuum Oil Co.

Oil, Dynamo
Vacuum Oil Co.

Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.

Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp.

Oils & Greases, Engine
Vacuum Oil Co.

Oils & Greases, Lubricating
Vacuum Oil Co.

Oils & Greases, Motor
Vacuum Oil Co.

Oil, Linseed.
National Lead Co.

Oils, Locomotive Valve
Vacuum Oil Co.

Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.

Oil, Turbine
Vacuum Oil Co.

Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.

Oxygen.
Oxweld Railroad Service Co., The.

Packing.
Westinghouse Air Brake Co.

Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.

Packing, Asbestos.

Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Westinghouse Air Brake Co.

Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Ring Boiler.
Union Asbestos & Rubber Co.

Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.

Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.

Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.

Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.

Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paint, Powder.
Aluminum Co. of America.

Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.

Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.

Paper, Carbon.
Remington-Rand Business Service.

Paper, Sheathing.
Carey & Co., Philip, The.

Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.

Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pickling Equipment, Monel Metal.
International Nickel Co., The.

Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company

Piling, Wood.
National Lumber & Creosoting Co.

Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.

Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.

Pins, Air Brake & Clevis.
Champion Rivet Co.

Pins, Center.
Miner, W. H.

Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.

Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.

Pipe, Corrugated Iron
Armco Culvert Manufacturers Association

Pipe, Paved Invert
Armco Culvert Manufacturers Association

Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.

Pipe Fittings—(See Fittings, Pipe).

Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.

Pipe, Perforated Iron
Armco Culvert Manufacturers Association

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Steel Signal.
National Tube Co.

Pipe, Spiral Welded.
Armco Railroad Sales Co.

Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.

Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.

Plates,
Steel Car Forge Co.

Plates, Follower.
Steel Car Forge Co.

Plates, Boiler, Firebox—(See Steel Firebox).

Plates, Center—(See Bearings, Center).

Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.

Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.

Plates, Tin and Terne.
American Sheet & Tin Plate Co.

Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.

Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.

Plows, Railroad and Grading.
Western Wheeled Scraper Co.

Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.

Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Pneumatic Tools.
Ingersoll-Rand Co.

Poles, Creosoted.
National Lumber & Creosoting Co.

Poles, Power Distribution.
National Lumber & Creosoting Co.

Poles, Preservatively Treated.
National Lumber & Creosoting Co.

Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.

Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.

Poles, Telegraph.
National Lumber & Creosoting Co.

Poles, Transmission.
National Lumber & Creosoting Co.

Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Poles, Wood
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Posts, Farm.
National Lumber & Creosoting Co.

Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Posts, Highway.
National Lumber & Creosoting Co.

Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.

Posts, Wood.
National Lumber & Creosoting Co.

Powder, Blasting—(See Explosives).

Powdered Coal Equipment.
Muhlfeld, John E.

Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Power Transmission Supplies.
Sellers & Co., Inc., Wm.

Preservatives, Wood.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.

Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm.

Pulverizers, Coal — (See Crushers, Coal).

Pumping Stations.
Fairbanks-Morse & Co.

Pump Liners, Monel Metal.
International Nickel Co., The.

Pump Rods, Monel Metal.
International Nickel Co., The.

Pump Shafts, Monel Metal.
International Nickel Co., The.

Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Poles, Creosoted.
National Lumber & Creosoting Co.

Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Punching and Shearing Machines.
Ryerson & Son, Joseph T.

Pushers, Coal.
Standard Stoker Co.

Pyrometers, Superheated Steam.
Superheater Co., The.

Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.

Rail-Bonds.
American Steel & Wire Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Rail Braces — (See Braces, Rail).

Rail Reclamation Equipment.
Ryerson & Son, Joseph T.

Railroad Shops.
United Engineers & Constructors, Inc.

Rail Splice Plates — (See Joints, Rail).

Railroad Structures — (See Engineers and Contractors; also Building).

Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.

Railway Signals.
General Electric Supply Corp.

Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.

Recorders, Speed & Cut-off.
Valve Pilot Co.

Rectifiers for Signal Work.
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.

Reducing Valves.
Vapor Car Heating Co., Inc.

Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.

Refrigerators.
Wine Railway Appliance Co.

Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co. The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co

Roofing, Corrugated.
Armco Railroad Sales Co
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
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Roofing, Tile.
Federal American Cement Tile Co.

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Rust Preventatives.
Dearborn Chemical Co.
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Safe Ends.
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Sanitary Products.
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Western Wheeled Scraper Co.

Screens, Passenger Car.
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Shapers.
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Sellers & Co., Inc., Wm.

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Illinois Steel Co.
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Sheds, Train.
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Sheets, Iron & Steel.
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Armco Railroad Sales Co
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Sheets, Steel.
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Industrial Brownhoist Corp

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Siding, Iron & Steel.
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Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
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Tubes, Staybolt.
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Tubing, Seamless Steel.
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Valves, Drifting.
Ardco Mfg. Co.
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Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief
Ashton Valve Co.
Vapor Car Heating Co. Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating
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Valves, Throttle.
American Throttle Co., Inc.
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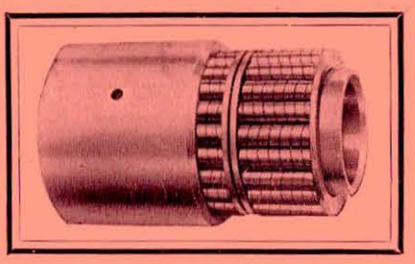

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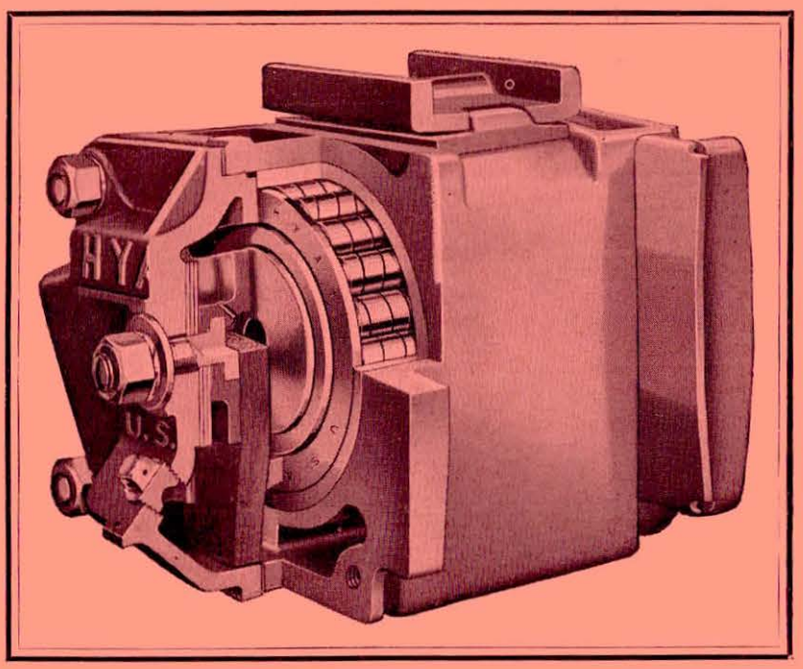

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PRODUCT OF GENERAL MOTORS

ANOTHER ECONOMIC ACHIEVEMENT

The marked improvement in freight train performance on one of our leading railways is shown in the following table:

	1929	1923	Per Cent Inc.	Per Cent Dec.
Gross ton-miles (millions)	33,126	22,405	48	..
Freight train-miles (thousands)	10,388	10,286	1	..
Freight train-hours (thousands)	760	964	..	21
Gross tons per train	3,189	2,178	46	..
Average train speed	13.7	10.7	28	..
Gross ton-miles per train-hour	43,604	23,243	88	..
Cost per thousand gross ton-miles (cents)*	36.1	70.2	..	49

*The cost per thousand gross ton-miles includes road freight wages, fuel, supplies and enginehouse expenses.

Due to the improvement in freight train operation, 1929 over 1923, there was a saving of 34.1 cents per thousand gross ton-miles. On the basis of the gross ton-miles produced in 1929 (33,126,000,000), this amounts to a total saving of $11,295,966.

The road making this record increased its automatic block signal miles of road by 66 per cent.

This improvement in signal efficiency made a large contribution to the improvement in freight train performance.

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UNION SWITCH & SIGNAL COMPANY
Swissvale, Pennsylvania

GENERAL RAILWAY SIGNAL COMPANY
Rochester, N. Y.

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Signals Aid Modern Motive Power to Produce More Ton-Miles Per Train-Hour